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REPORT

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PEACE RIVER AND TRIBUTARIES

IN

1891

BY

Wm. OGILVIE

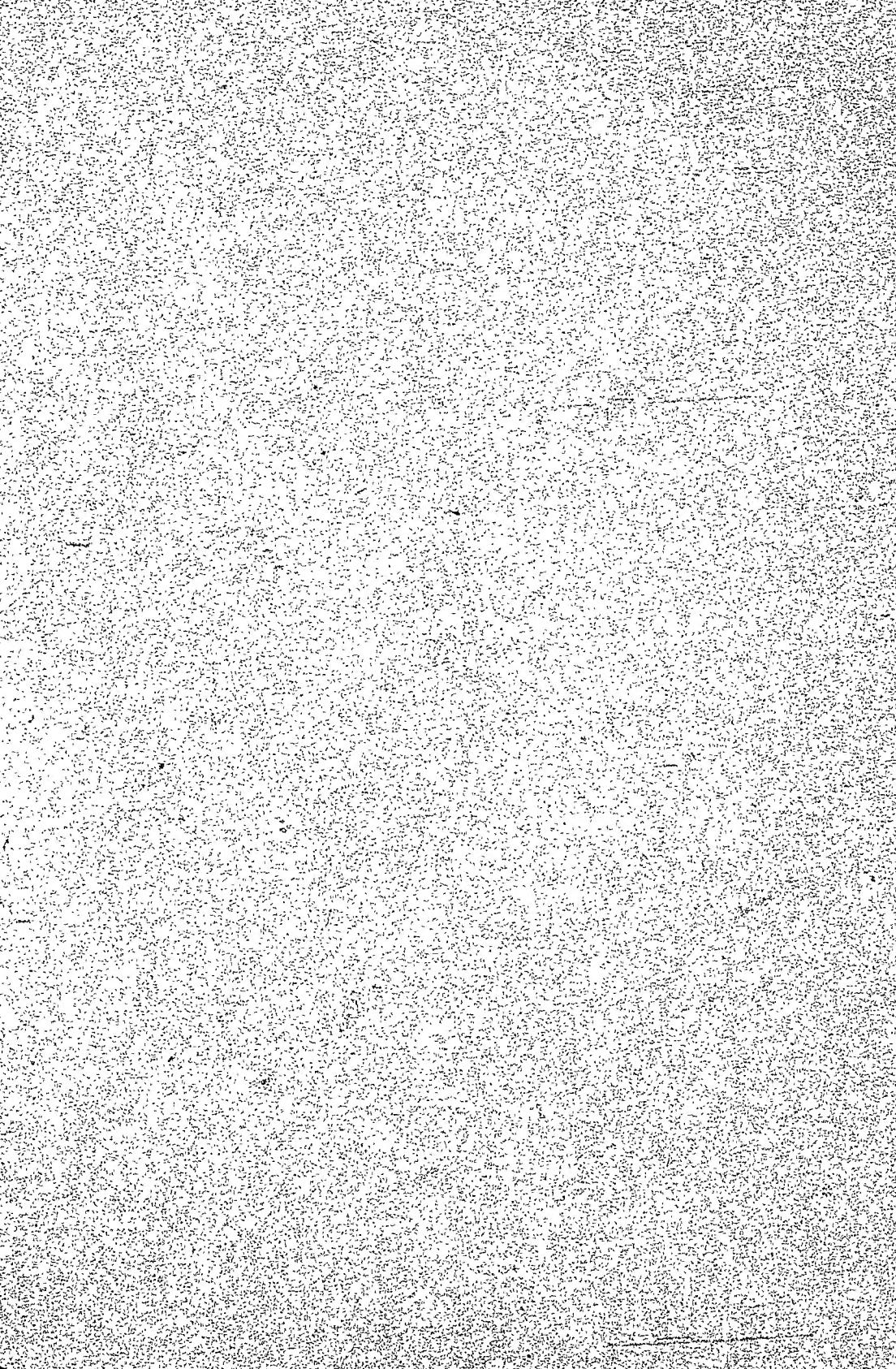


OTTAWA

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OTTAWA, 7th April, 1892.

To the Honourable
The Minister of the Interior.

SIR,—I respectfully submit the following report of my operations for the season of 1891.

On the 5th of June of that year instructions were issued to me from the Surveyor-General's Office directing me to make a thorough exploration of the region drained by the Peace River and its tributaries, between the boundary of British Columbia and the Rocky Mountains, and to collect any information that may be of value relating to that region. The nature and extent of my work was, of necessity, left largely to myself, as also was the method of my surveys.

As it was desirable that I should, if practicable, connect the end of my micrometer survey of the Mackenzie River made in 1888 with that made on the Great Slave River in the same year, which I was then unable to accomplish on account of high water, I took along the necessary instruments, but owing to circumstances which will be detailed further on I found it impossible to complete this work.

Immediately upon intimation that this work was to be intrusted to me I ordered a suitable canoe from the Ontario Canoe Company, Peterborough, after having ascertained that I could obtain it more quickly there than elsewhere.

As there was no practical benefit to my work to be obtained by going ahead of the canoe and awaiting its arrial at any point on my route, I remained in Ottawa until I learned that it was so far advanced that I would not be delayed on my way waiting for it.

This occasioned my stay in Ottawa until the evening of 30th of June. I have thankfully to notice the action of the Canadian Pacific Railway authorities in this connection. I represented to Mr. Burgess, Deputy Minister, the urgent need of the canoe being hurried to its destination, more especially as I found it impossible after much inquiry to have it sent by express. Mr. Burgess requested the officers of the company to give the matter their attention, which they kindly did, with such effect that the canoe was very little delayed on the way to Calgary.

I reached Calgary on the morning of Sunday the 5th July. The following day was spent making preparations for departure on the daily construction train on the Calgary and Edmonton Railway, by which train I left on Tuesday morning. Late that evening the end/of the track was reached.

Next morning I found a wagon and buckboard waiting to take me to Edmonton for which I had arranged from Ottawa by letter and Calgary by telegram. The distance to Edmonton by this conveyance was between 25 and 30 miles and Edmonton was reached late on the evening of the 8th July. The 9th was spent procuring

my-provisions and engaging the service of a man to accompany me. The following morning I started for Athabasca Landing, which I reached early on the morning of the 13th. I spent the remainder of the day settling with my transport men and writing letters, as there was no certainty that I would be able to send out again until my return to Edmonton in the fall or winter, though there was some chance of it.

On the morning of the 14th inst., I left the Landing on my way down the Athabasca River. Grand Rapids was reached at noon on the 16th. Here I found the Hudson's Bay Company's steamer "Athabasca" awaiting the arrival of the "up" boats from McMurray with the yearly fur returns of the district. As the captain of the steamer told me he was going down to the island in the rapids on the following morning, I decided to wait and have him put my canoe and outfit weighing about 1,500 pounds over the island on the tramway, and thus pass the worst of the rapids instead of toiling along the shore and carrying most of the stuff on our backs, which would have taken a couple of days, whereas the other route required only a few hours to pass over, and besides, the company's large boat would put us over the very rough water at the foot of the rapids. In connection with my descent of this river, although it is an old and much travelled route, it will not be considered I hope supererogation on my part to give a short description of it and make some remarks on the difficulties in its navigation.

With this in view I will commence at its confluence with the Pembina River, which joins it about 40 miles above Lesser Slave River, or about 110 above Athabasca Landing. In this stretch there are only three or four slight short rapids, which in high water are not noticeable as such and in ordinary water can easily be run in ordinary canoes. The Hudson's Bay Company's steamer runs from Athabasca Landing up to Lesser Slave River, and in ordinary stages of water finds no difficulty in doing so, but I know were she to attempt this in low water in the month of October she would find many spots too shallow to pass over. I may here incidentally say that she has made several attempts to ascend the Lesser Slave River to Lesser Slave Lake, but so far without success. The lower twenty miles of that stream are shallow and swift, almost one continuous rapid, with many places in it, which in ordinary stages of water do not afford more than 15 or 18 inches of water. After heavy rainfalls this stream rises rapidly, and were the steamer at the river during one of these rises she would find no serious difficulty in ascending, but unfortunately she has so far never been so situated. The intention when she was built was to run her to Lesser Slave Lake Post at the west end of the lake, but up to date she has not succeeded in doing so. Lesser Slave River averages about 120 yards in width and from the lake down to the head of the rapids is deep and of easy current, and could the steamer once reach it no question could arise as to her procedure.

From Athabasca Landing down stream the Athabasca River is free of hindrance to navigation for about 120 miles, when we reach Pelican Rapids. These are not difficult to navigate, the only trouble in them arises from low water and some rocks in the channel. When the water is high there is no danger at all, as the steamer can easily ascend under a good head of steam. It appears they take their name from the presence of pelican in or about them nearly all summer, both times I went down the river I saw them there. A fair-sized canoe can be run down those rapids with safety.

One hundred and sixty-five miles below the Landing, Grand Rapids are reached. This is the rapid of the river, and partakes more of the nature of a cataract than of a rapid. In the middle of the channel there is an island, over which the Hudson's Bay Company have constructed a tramway on which to transport the outfits for all the northern posts. The steamboat landing is about one and a half miles above the island, the intervening water very shallow, with many rocks and very rapid current. Through this the company has made a channel by removing rocks. Between this steamboat landing and Fort McMurray the company does all its transport with large boats, locally known as sturgeon nosed or sturgeon boats, from the fact that both bow and stern are spoon-shaped and somewhat resemble a sturgeon's nose. These boats are capable of floating about ten tons each, and are each manned with a

crew of ten or twelve men and when loaded draw upwards of two feet of water. The time of their ascent and descent varies much with the height of water, as in some of the rapids more or less portaging has to be done, which varies with the depth of water. Below the island in Grand Rapids there is nearly two miles of rough water, which in low water requires much care in navigating to avoid rocks and shallows.

Between Grand Rapids and Fort McMurray there are ten rapids. I obtained from the pilot of the steamboat (a man who was acknowledged by all I inquired of, to possess as complete and reliable knowledge of the river from the Landing to Lake Athabasca as any man in the country) the names of those rapids and the best way to run down them.

The first in the order of descent is named "Brûlé Rapids." It is about 25 miles below Grand Rapids. In it the river spreads out from 250 or 300 yards in width to upwards of 400. In mid-stream the water is shallow, so much so that large trees ground on their way down. The channel is on the left side of the river, and quite close to the shore. It is not more than one-fourth of a mile long and by keeping not more than twenty or thirty yards from shore there is no danger in its descent. It appears the rapid takes its name from the presence of an extensive brûlé. About sixteen miles below it comes "Boiler Rapids." This is quite an extensive rapid though only the lower part of it is very rough. In high water the left side affords the safest channel to run in, and in low water the right side. It takes its name from the fact that the boiler intended for the Hudson's Bay Company's steamer on the lower river was lost in the rapid through the wrecking of the scow which contained it on its way through in 1882. At the foot of this rapid there is much rough water, which requires a good sized canoe for its safe descent.

In sight of the lower end of the above comes "Drowned Rapids." The channel here is on the left side, quite close to the shore, and were it not for three or four large swells caused by rocks, it might be run down by any one without any apprehension of danger. It takes its name from the fact that a man named Thompson was drowned some years ago by the swamping of his canoe in running through it. I had the misfortune in 1884, to lose a member of my party in a similar manner, though I have gone through them myself twice and ran no risk that I was aware of. Less than a mile from this rapid we enter "Middle Rapid." This is not very rough, but is somewhat shallow and stony. The channel in this is on the right side.

The next rapid is known as "Long Rapid," and the channel here is also on the right side. The water is not very rough in it.

Next in succession is "Crooked Rapid," from the fact that in it the river makes a very short turn round a limestone point. The channel is on the right side, and is not rough, with the exception of a small "chute" just at the head; this requires care in a canoe.

"Stony Rapids" come next, in them the channel is on the right side and is not very rough.

The next is appropriately known as the "Cascade," the river falling over a ledge of rock about three feet high. The channel is on the left side and certain stages of water permit fair sized canoes to descend it without much risk.

The last rapid worthy of note is known as "Mountain Rapid," by reason of the high banks in its vicinity. It is rather rough, but there is a good channel which at the head is on the left side, in the middle there is a piece of smooth water through which a crossing is made to the right side, which is quite smooth, while the left side is very rough.

The last of the series is known as "Moberly Rapid." It is only a ripple caused by some rocks on the left side of the river, in the midst of a swift current. On the right side the water is smooth enough for the passage of the smallest craft.

From the head of Grand Rapids to Fort McMurray is upwards of 85 miles, which is altogether too bad for the present steamer to ascend. It is the opinion of some that with proper appliances the present steamer might succeed in doing so, but it appears to me that such a project would involve much expensive labour and considerable risk.

From McMurray to Fort Chipewyan on Lake Athabasca a distance of about 180 miles by the shortest channels, but nearly 200 by the channel, the steam-boat has to pass through in ordinary stages of water, there is neither obstacle nor hindrance to its passage. This steamer also makes her way up Peace River as far as the falls, about 220 miles from Chipewyan, the only hindrance in this distance being the Little Rapid, about 100 miles from Chipewyan, and even this, except in very low water, is not serious.

I arrived at Chipewyan on the evening of the 23rd July, and here spent the following three days taking observations to determine the latitude and longitude, of which more will be said later.

From Chipewyan to Smith's Landing on Great Slave River there are no serious obstacles to navigation. There is a slight ripple in the channel between the lake and Great Slave River caused by a ledge of rock across the outlet of the lake, and in low water the steamer sometimes touches bottom, but never so much as to detain her for any long period. In Great Slave River there are one or two places where rock ledges cause a ripple, and in low water the greater part of the channel is shallow, but in all these places there is a part where the water is deep enough to afford the steamer easy passage at all times.

From Smith's Landing to Fort Smith about fourteen miles by the land or portage route, and about sixteen by the river, there are numerous and bad rapids aggregating about 240 feet fall, which puts all thought of navigating it out of the question.

In continuing the statement of my route I may as well conjoin with it such information as I observed and gathered on my way concerning the navigability of the water route from Fort Smith to the Arctic Ocean and part of Great Slave Lake, though such a course will carry me far beyond the limits of my journey during the past season.

On my arrival at Fort Smith I found the Hudson's Bay Company's steamer "Wrigley" there loading for her down trip. I arrived there on the afternoon of the 30th July, and spent the greater part of that night getting observations to determine its geographical position. The following evening the "Wrigley" started for Fort Resolution on Great Slave Lake, and on the way down I obtained much information of value from Captain Bell, commander of the steamer, concerning the depths of water and obstacles in the route. To render this information more intelligible I will premise with a short description of the "Wrigley," and the route she travels over. This steamer was built at Fort Smith by the Hudson's Bay Company in 1886 and made her first trip in 1887. The magnitude of such an undertaking, small as she is, can be appreciated when we know that every bit of lumber used in her construction had to be sawn by hand. All her machinery had to be transported upwards of 100 miles by horses over pretty bad roads, and then taken nearly 300 miles in scows, and 240 on the company's steamer "Athabasca." Her dimensions as given me by Captain Bell are eighty feet keel, fourteen feet beam, five to six feet draught at stern when loaded and four to five at bow. Her propeller is a four and a half feet four-bladed screw with adjustable blades. Her engine, manufactured by the John Doty Engine Co. of Toronto, with about 60 pounds pressure, will drive her about eight miles an hour, but she can be driven ten. In the course of a season the requirements of the company's service necessitate her travelling about 6,500 miles, and her maximum load is about thirty tons. In this connection I will here state that the two steamers plying on the Athabasca, Peace and Great Slave Rivers are named respectively "Grahame" and "Athabasca" (the latter above Grand Rapids on the Athabasca and on Lesser Slave Rivers) are flat-bottomed stern wheelers capable of carrying one hundred and forty tons if required; with this load I was told they would draw two and a half to three feet of water. Loaded light they draw less than two feet. They are said to be capable of steaming twelve miles an hour in dead water, but do not try more than ten. The "Grahame" was built at Fort Chipewyan in 1882 and 1883, and as in the case of the "Wrigley" all the lumber for her had to be sawn by hand. The "Athabasca" was built at Athabasca Landing, but in her construction the aid of a waterous portable saw-mill was obtained.

Going down the Great Slave River, Capt. Bell kindly pointed out to me the shallow places and gave me the depths of water in each of them. Just below Fort Smith there is an extensive bar, but there is a channel through it which always affords plenty of water for the passage of the "Wrigley." The shallowest place in the river is alongside an island known as "Big Island." The lowest water Capt. Bell ever experienced in the country, which by the way is generally admitted to have been unusually low, gave six feet here; in average water there is nine feet, and at date of my passage (1st August) there was thirteen feet. This shoal is about 200 yards across, and is on the left side of the island. The other channel is much the widest but is full of sand bars, and unless in very high water the "Wrigley" could not get through it. Capt. Bell found in all the other parts of the river from twelve to thirty-six feet of water at average height. As is usual in all such places, there are bars across all the mouths where they empty into the lake. On the one through which the steamer enters the lake there is in very low water five and a half feet and in high water eight, medium gives from six to seven, but this varies a good deal with the force and direction of the wind; a south-westerly wind lowering it and north-easterly raising it. Owing to the displacement of the channel marks by a violent storm a few days before our arrival the boat ran aground on the bar, with no other result than a couple of hours' detention.

Capt. Bell informed me that in his passages around and across the Great Slave Lake he has done much sounding and found generally as follows: Two miles from shore four fathoms, six miles twenty fathoms. In mid-lake on the way from the mouth of the Great Slave River to the head of Mackenzie River he generally found upwards of forty fathoms and in places sixty fathoms gave no bottom. In the arm of the lake on which Fort Rae is situated he found fifty miles below Rae twenty fathoms, thirty miles from Rae three fathoms, eighteen miles two fathoms, and seven miles seven feet which continues up to Rae. The bottom in this arm he found muddy with many boulders in it.

At Resolution I spent a few days taking observations to determine the latitude and longitude, when I procured an additional canoe and two men to help me to connect my micrometer survey of Great Slave River with that of the Mackenzie River, which I was unable to do in 1888 on account of exceedingly high water in the lake. I found a scarcity of provisions at Resolution and was only able to procure a very small quantity, much less than would suffice to finish this survey unless I were favoured with exceptionally fine weather. I started at the northerly end of my micrometer traverse on Great Slave River on 6th August, and continued the survey to Resolution, reaching there the same evening, here I was detained by high winds for four days, resuming my micrometer survey along the south-east shore of the lake on the 11th, which I continued for three days, in that time doing only thirty-three miles, so much delay arose from head winds. At this rate of progress our provisions would be exhausted long before we got out of the lake with the survey, so I determined to discontinue this work and proceed as fast as possible to my destination, as I was already behind time, and unless favoured by a very late and open fall would have much difficulty in making my way from the Liard through to the Peace River.

I concluded the micrometer work on a small island close to the south-east shore of the lake known as "Dead Man's Island," and marked its terminal point station No. 20 by planting a post firmly in the ground and cutting into it with a knife the following inscription:

William Ogilvie.

No. 20.

Dead Man's Island takes its name from the occurrence there of what was said to be a fight between Indians, but from some description I got of it, it would appear to be more like a series of murders. I could learn nothing very definite concerning it, at least nothing worthy of submitting as authentic and in such case I consider it best to submit nothing. The number of killed I have heard stated all the way from twelve or fourteen to two hundred. A half-breed with me told me that some years

ago the bones and skulls of the killed were very numerous, but I could not find any trace of such, though I made a pretty thorough search. This fight is said to have occurred about sixty years ago.

Here I discharged my help and canoe hired at Resolution. The strong wind which had been blowing for three days abated sufficiently to allow us to proceed on the evening of the 14th. Calm weather that night and the following day enabled us to reach Hay River on the evening of the 15th. Here observations were taken to determine latitude and longitude, and early next morning we took our departure being favoured with a fair sailing wind which helped us along until it increased to a gale when we had to put ashore. Owing to head winds it was the 20th August before I reached Fort Providence. I remained here during the 21st, and got observations for latitude and longitude, resuming my way down the Mackenzie River on the 22nd, and arrived at Fort Simpson, the turning point in my journey, on the evening of the 25th. Here I remained taking observations and making preparations to ascend the Liard and East Branch locally known as the Nelson.

Before proceeding with the account of my ascent of the Liard and East Branch, I think it proper to continue the information concerning Mackenzie River which I obtained from Capt. Bell and others. Capt. Bell gave me the following notes of his soundings in that river from Great Slave Lake down to the delta, a distance of about one thousand miles.

At the entrance to the river from the lake, the river is very wide and consequently shallow. Search was made here for a suitable channel for the steamer, and of course the notes furnished refer exclusively to this channel. In ordinary low water this channel affords about six feet, in very low water only five feet. In ordinary high water, such as when I passed, there would be about nine feet, but in 1888 there must have been thirteen or fourteen feet. Capt. Bell thinks this shoal is the result of ice shoves by the ice on the lake, as quite close to it on both sides there is twelve to fourteen feet of water. It consists of gravel, and is, he says, only about two hundred yards across, so that improving it would not be a very difficult undertaking.

Five miles below this there is another shoal known as "Trout Island Shoal." On this in low water there is six feet of water, but it appears the depth is very irregular, which Capt. Bell thinks is due to the bottom being scraped by ice and deposited in heaps. He thinks a proper search would show a deep channel all through here but it would be very crooked, as it would wind about those gravel heaps. This shoal extends about a mile and a-half. Through "Beaver Lake" in low water there is ten feet in depth, in ordinary water twelve and in high water fourteen. Of course this refers to the shallowest places in it.

Providence Rapid, situated a little above Fort Providence, gives five feet in the shallowest places in low water, in ordinary stages six to seven feet. This extends for about two miles. Here, as in the forementioned places, a good channel could be found, but it would be very crooked, so much so that a steamer descending could not keep in it. From this rapid down to Rapid Sans Sault the least depth in the lowest water was found to be twelve feet.

Rapid Sans Sault is caused by a ledge of rock extending across the river. Near the easterly shore the water drops over this a few inches and causes quite a commotion across the easterly half of the river. In the westerly half there appears to be a greater depth of water and smoother current. It need hardly be said that the steam-boat channel is on the westerly side in the smooth water. Over the ledge the lowest water found by Capt. Bell, in a year remarkable for the low state of all the rivers in the country, was six feet.

Over the ledge of the Cascade Rapids, which are caused by an obstruction similar to that at Rapid Sans Sault, Capt. Bell found nine feet in low water, and eleven in good water. This rapid is near the head of the "Ramparts".

Close to the Ramparts there is another rapid known as "Rampart Rapids"; this also is caused by rock bottom in the river. In it in lowest water Capt. Bell gives the depth as eleven feet and in high water fifteen. This extends about half a mile.

In his various passages of the Ramparts, Capt. Bell has sounded without finding bottom with forty fathoms, which was the length of his sounding line. I have mentioned in my report for 1889 that Sir Alexander Mackenzie found fifty fathoms here.

Between the Ramparts and the delta, where the steamer leaves the main channel, less than twelve feet depth was never found, but Capt. Bell says that less might be found. Through the channels of the delta to Peel River no difficulty was ever experienced with the steamer.

In Peel River up to the bar, five miles below Fort McPherson, average depth of water about fifteen feet, on bar in low water about six feet, medium water seven feet.

Count de Sainville, a French gentleman who went down the Mackenzie in 1889, and spent much time in making an examination and rough survey of the delta of the Mackenzie and Peel Rivers and the coast line in the estuary of those streams, was good enough to give me all the information in his power. His description of the country in this vicinity is interesting, and will be given later on. He assured me the most easterly channel of the delta is the main one, and he never found less than twelve feet depth in it down to tide water. The tides do not come up more than ten or twelve miles above the ocean, and the rise is not more than a couple of feet. What depth might be found beyond the mouth of the river he is not prepared to say, but bars there may naturally be looked for. This gentleman purposes making further and more complete examinations which will no doubt be of much interest and value. He promised to send me a copy of his map of the delta, which he told me would differ much from what is usually shown on our maps. I have not yet received it nor do I expect it for some months to come.

Before resuming the narrative of my journey, I will give some notes I obtained from Capt. Segur, of the steamer "Athabasca," and Capt. Bell of the steamer "Wrigley," giving the times over the various parts of their runs.

Steamer "Athabasca," 2nd. June, 1891, ran from Athabasca Landing down to landing of Grand Rapids, about 163 miles, in eighteen hours with six large boats in tow. Up trip started on 6th June, running time to Athabasca Landing forty-eight hours. Second trip down, 13th July, running time down fifteen hours and forty-five minutes. In 1890, her first down trip, made the second of June, was done in twenty hours and fifty minutes; and the return, 10th June, in fifty hours. This run was made in very low water.

The "Wrigley's" log shows the following averages between Fort Smith, the most southerly part of her run, and Fort McPherson, the most northerly, the distance between them is about 1,270 miles. From Smith to Resolution, nearly on Great Slave River, average running time about eighteen hours; between Resolution and Providence about seventeen hours, of which twelve and a half is in Great Slave Lake, between Providence and Simpson about fourteen hours, Simpson to Wrigley about ten and a half hours, Wrigley to Norman about fourteen hours, Norman to Good Hope about thirteen hours, Good Hope to McPherson about twenty-four and a half hours. The total running time is $123\frac{1}{2}$ hours, a trifle over ten and a quarter miles per hour.

On her "up" runs the following averages have been made, McPherson to Good Hope forty hours, Good Hope to Norman thirty-four hours, Norman to Wrigley thirty-nine hours, Wrigley to Simpson nineteen hours, Simpson to Providence about twenty-eight and a half hours, Providence to Fort Rae, not certain, appears to be about thirteen hours, Providence to Resolution about twenty hours, Resolution to Smith about thirty-five hours, Resolution to Rae about fifteen hours and return about the same, as it is all lake water. The duration of these runs varied somewhat by the force and direction of the wind. The total running time from McPherson to Smith as shown above is $215\frac{1}{2}$ hours, which gives a rate of 5.9 miles per hour. The mean of the up and down rates is a fraction over eight miles per hour, which is said to be her normal speed.

I have given the distances between those posts in my report of 1889, but for convenience of reference will here recapitulate them going down stream:—

	Miles.
Smith to Resolution.....	190·5
Resolution to Providence.....	167·0
Providence to Simpson.....	157·5
Simpson to Wrigley	134·0
Wrigley to Norman.....	180·3
Norman to Good Hope.....	169·5
Good Hope to McPherson.....	274·7
Total.....	1,273·5

It may be of general interest to the public to state how easily any one who is desirous of doing so can get beyond the Arctic Circle or into the Arctic Ocean if so minded. We will presume we are in Ottawa, and wish to visit the land of the midnight sun. Four days from Ottawa *via* the Canadian Pacific Railway we arrive at Calgary, one day from Calgary we arrive at Edmonton *via* the Calgary and Edmonton Railway. From Edmonton three to four days will be required to reach Athabasca Landing, this part of the route (about one hundred miles) has to be made with the aid of horses. By timing ourselves to reach Athabasca Landing about the first days of June, we will likely catch the steamer "Athabasca" at the Landing, and go down to Grand Rapids on her. From Grand Rapids it will take us three or four days to reach McMurray, and if we are fortunate enough to catch the steamer "Grahame" there, we will reach Chipewyan in a day. Another day will take us to Smith's Landing, and another to Smith, if we are fortunate at Smith's Landing we can get to Smith the same evening we arrive. If we meet the steamer "Wrigley" at Smith, and she is bound for McPherson for which she generally starts about the last days in June or the first days in July, we will likely reach McPherson in seven or eight days. The steamer has not heretofore gone farther down than the delta, but it is possible she may in the future go down to the Arctic coast and along it a short distance.

From the foregoing we see that even with the present facilities, we can reach the Arctic Ocean from Ottawa in about twenty-three days, let us say to cover possible contingencies thirty days, and return in about forty. On the way we will pass through about 1,200 miles of beautiful prairie country, which extends almost to Athabasca Landing, and from Athabasca Landing to the Arctic Ocean, upwards of 1,800 miles, we have only ordinary river navigation with the exception of a few miles on Lake Athabasca, and about 120 on Great Slave Lake. During the whole of the journey we are likely to experience as pleasant weather as if we had remained in Ottawa, and it may be pleasanter. We are likely to see much that will interest and surprise us, and we will certainly have a much clearer conception of the extent and value of our country. All the way to the Arctic coast we will see timber and plants similar to much we see here, and were it not for the absence of many of our trees, and the increased duration of daylight (which we will likely find at the coast to be of twenty-four hours duration each day) we would hardly realize that we had travelled upwards of 4,000 miles from Ottawa, and been more than 1,600 north of it. I cannot specify the cost of such a trip, but would place the maximum at about \$300. It is well to bear in mind that north of Edmonton the steamers have no regular date of sailing, their movements being governed by the Hudson's Bay Company's needs, and transport facilities over the other parts of the route, and it is possible that we might not even be able to make our way to the Arctic on the steamer, but there would be no great difficulty in completing our journey with such aid as the Hudson's Bay Company could place at our disposal, in which case our journey would partake more of the primitive style of travelling and be a more satisfactory experience to ourselves.

I left Fort Simpson on the forenoon of the 28th August, taking with me two Indians as aid. The Liard River a short distance above the confluence with the Mackenzie is from 600 to 800 yards wide. The current is generally strong and at one point, about nine miles up, there is almost a rapid. About thirty-three miles

above Simpson what is known as the Rapid commences. In this the river is much wider than usual, being not far from three-quarters of a mile across; on both sides are high rock banks, in many places rising perpendicularly from the water's edge. At those points in high water it is impossible to walk along the beach, as the swift current does not permit rowing or paddling up, and large boats cannot be poled up; this renders the ascension of the river impossible until the water falls. No part of this rapid is too rough for the descent of an ordinary canoe, and the only danger in a passage down might be from rocks and shallows. There is nothing in this rapid to prevent the passage up it of such steamboats as are now on the Athabasca River, if there is sufficient depth of water over the ledges. As our passage up was necessarily confined to the shore water I cannot speak from personal observation on this point, but I have been told that in very low water many of the ledges would not permit a steamer to pass over them. There would however be water enough during a good part of the summer, or I am greatly deceived in the appearance of the place. This rapid from head to foot is about six and a half miles long. About ten miles above this there is a ripple over a gravel bar, where there is a large island in the river, this would not hinder the ascent of a steamer such as I have spoken of. There are two or three places where the current is very swift between here and Fort Liard, but a steamer which would work her way up to them could easily ascend them.

Between Simpson and Liard no streams of any importance enter the Liard. About 105 miles above Simpson the Nahanni enters from the west; it is about 200 yards wide at the mouth. I did not learn anything concerning it, but as it comes from the mountains it is not probable that any extent of it is navigable. About fifteen miles above this another small river enters from the west. About 176 miles above Simpson, Muskeg River enters from the east. It is an unimportant stream, little larger than a creek. It flows out of a small lake called Lake Bovie, which is fifteen or twenty miles from the Liard River.

Fort Liard, 182 miles from Simpson, was reached on the evening of the 4th September. Here I remained until noon of the 7th taking observations and collecting information about the surrounding country, all of which will appear in its proper place. Here I paid off the two Indians who accompanied me from Simpson, and engaged two other men to accompany me to Fort Nelson on the East Branch. From Fort Liard to the mouth of the East Branch the distance is about fifty-seven miles. In this stretch only two streams of importance enter the Liard. The first is called "Black River," and enters from the east just above Fort Liard. The water is dark and clear, and from its volume retains its colour several miles below the mouth before it is mingled with the Liard waters. The river at the mouth is upwards of 200 yards wide. About fifty miles up, there is said to be a bad rapid, but as it was described to me it appears to be more a short cañon with a sharp bend in it, which makes a dangerous whirlpool. There was no one around the place when I was there who knew anything about the stream farther up. It is said to flow out of a large lake, called Lake Bistcho.

About twenty-six miles from Fort Liard the Labiche River enters from the west; at the mouth it is quite large, but does not appear to be of much importance. At Fort Liard the Liard River is about 600 yards wide, with a depth of ten feet in mid-stream in low water. Between this point and the junction with the East Branch there are no rapids, though there are a couple of places where the current is rather strong.

I believe any steamer that could make her way up to Liard could make her way up to the East Branch. The Liard up to this point is seldom less than 600 yards in width, and often nearly a mile. In places there are many islands and bars in it. I did not learn anything of the depths of water in the channel, but it appears from what I saw and heard, that with the exception of the rapids, light draught steamers could navigate it any time.

East Branch River, or as it is locally known, the Nelson, is from 200 to 400 yards wide. Between the Liard River and Fort Nelson, situated on the East Branch, a distance of about 111 miles, no streams of any importance enter this river. The largest, known as "Deer River," is not more than forty yards wide, another about thirty yards wide, known as "Snake Creek," joins about fifteen miles below Fort Nelson.

At the stage of water in which I went up it, I feel confident stern-wheel flat-bottomed steamers, such as are on the Athabasca, could make their way up to Fort Nelson with comparative ease.

I arrived at Fort Nelson in the afternoon of the 15th September. I found there were only three or four Indians here, and of those only one knew anything of the route by which I proposed to reach Peace River. His trip through to the Peace had been made when he was a child, consequently his recollections of the route and its directions and difficulties were not very reliable. In any case he was a cripple, and his services as a man would have been *nil*, while as a guide they would have been very doubtful. The Indians attached to the post were expected in from their summer's hunt in a few days, in fact it was known that some of them were only a short distance up the river waiting for the rest to join them before they would come in. The weather for some days previous to my arrival at Nelson had been showery and unsettled, this culminated on the 16th in a heavy rainfall, which changed to snow on the 17th and 18th. This was damp and stuck to and loaded the trees in the forest to such an extent that this weight of wet snow broke thousands of them. The snow storm appears to have been local, as I afterwards learned that it had not extended to Peace River, nor more than 100 miles south from Nelson. The weather cleared on the 19th and the evening of that day I took the observations necessary to determine the latitude and longitude of this place. The afternoon of the following day the Indians, who trade at the post, came in in a body; out of all their number it was found that only a few had any personal knowledge of the route I wished to pass over. To secure the services of any, I had first to win the good-will and approbation of the chiefs, of whom there were three. A long talk was indulged in, and some tobacco and bread was distributed to them before this was accomplished, many irrelevant questions were discussed before they would listen to my proposal about hiring help from them. They seemed to assume that I was a travelling chief among white men, and insisted that I should raise the price of furs before they would make any arrangement: it took some time to disabuse their minds of this impression. They then wished to know why I was so desirous of passing through this country. To have explained to them my real object would have invited an endless discussion of questions, which I would not care to answer even if I could, so I simply told them that it was my shortest and quickest way home, and as it was late I had no other choice; after some very sage reflections they seemed to think this satisfactory, and consented that three men should accompany me. After much discussion three men were selected, and as they had to make preparations, the following day was allowed them for that, but at the last moment one of them refused to go, and with some difficulty another one was induced to take his place.

As this post is off the main line of travel and the only white people seen at it are those in charge of the company's business and a missionary, the Indians have seen very little of white people or civilized life, consequently they retain more of their original manners and habits than Indians generally do. I will make a short reference to this in its proper connection. After considerable expostulation and hurrying, we got off on the morning of the 22nd. The first and second days out my Indian help was gay and good humoured but idle. They seemed to think that all that was required of them was to show us the way through, though before engaging I thought I made it plain enough to them, that it was aid more than guidance that I required; otherwise I would not have engaged so many of them. I understood from them that there was a portage which took from two to four days to traverse between the water system of the Liard and that of the Peace Rivers, which was my reason for engaging three and had my transport facilities been greater I would have taken more of them, and it would have been just as easy to secure ten or twelve as three. As I did not wish to vex them until we got fairly away from the Fort and got them committed to the journey, I quietly submitted to their idleness. The only help they gave us was an occasional straggling spurt, each one striking without any unison of effort. Often in the midst of a difficult piece of current they would all stop and watch our efforts, the only response they gave to a call for help in such

cases was a laugh. The evening of the third day out we met an Indian family on their way down the river, they had a large supply of meat on hand and invited our friends and ourselves to camp with them for the evening; this I was loath to do, but as the Indians were very desirous of doing so I consented rather than run the risk of vexing them and have them return with their friends, which they would have endeavoured to do. Next day they were more idle than previously, and manifested much discontent. That evening I was engaged for some time taking observations, at which they evinced much curiosity as I desired them to keep away from me. Then their superstitious dread may have been aroused: whatever the cause was, they left me between the hours of two and three o'clock the next morning. I heard some noise and arose to see what it was, when I found them gone; they had evidently heard me rising and went off so hurriedly that they left some of their property behind them. It transpired during our conversation with them, which we held with the aid of a few words of English they knew and signs, that only one of them had any personal knowledge of the route, the others never having been over it, whereas when I engaged them I understood distinctly that they all knew it well.

The Indian whom I met the evening before appeared to know something of it, and tried to portray its difficulties to me by signs, and as far as I could understand him tried to persuade me to return by the way I came: if I am correct in this he may have influenced my aids to return. Whatever the cause I was left in an awkward position; about finding my way no doubt ever arose in my mind as I knew my position, and also approximately that of St. John on Peace River, but to make my way from the Liard water system to the Peace, over a twenty-five mile portage with the aid of only two men at that time of the year would be hazardous, as winter might set in before I would get over the portage, or the stream we would descend to the Peace be frozen, besides our provisions would not last us such a protracted time. To return by the river would have been objectionable in several ways; first, it would not be likely that I would succeed in getting past Simpson or Providence where I would have to winter or make a snow-shoe tramp of ten or twelve hundred miles to get out, which would have taken most of the winter after snow-shoeing set in. Secondly, it would have given the Indians an idea that white men could not pass through an unknown country without their aid, which I am very far from believing. And the last and greatest objection was, that it would be abandoning entirely the object for which I was sent out. Thus impressed I continued up the river. The first four days proved tolerably easy and we made about sixty-one miles; after that the water in the river got shallower and the current increasingly stronger until two to four miles proved a hard day's work, and that was only accomplished by all hands getting into the water and hauling the canoe up rapids and over shallows, over which she would not otherwise pass. I kept on in hopes that this sort of thing would change for the better, but instead of improvement I found the reverse. The portage had been described to me as being close to the mountains. On the 5th of October I climbed to the top of the river bank, and from the summit of a hill got a look at the surrounding country. I could see that the mountains were at least forty miles to the west of us, and the direction of the river valley, looking upward, continued south for some distance yet. Now, to follow the river up to the portage, even if it were practicable in the time at my disposal, would lead me away from the region it was desirable to inspect, besides my provisions would not admit of a prolonged stay. I determined to follow the river another day, and see if there would be any improvement. Noon of the 6th determined me to abandon the river, and make my way to St. John, of which position I only knew that it was between ninety and one hundred miles south, and about sixty east of me; taking its position on extant maps as its correct position, which might or might not be true, more especially the longitude.

I will now describe the river and its affluents from Nelson upwards. About two miles above the post a river flows in from the west; it is called the Sicannie River. It is quite as large as the Nelson. The Indians described it to me as flowing through mountains for a long distance, and at one point in its course being quite close to the Liard, but they may be mistaken in this, and it may be the Turnagain or Black River they mean. Lately they have taken to its head-waters as their hunting ground,

and speak of visiting a trader situated on a river which flows into the sea, which is probably the Stikine River. They say it takes them several days to travel on foot from where they leave the Sicannie River to this trader's place. They described the current as being always swift, but there are no very bad rapids. The bed of the river is generally gravelly.

This river, like most mountain streams, is subject to great changes of level very suddenly, and of course the East Branch is correspondingly affected. Last season there were two sudden rises; the first began on the 5th June, and reached its maximum on the 7th, at which it remained for three days; this was the highest it has ever been known to be. One very old Indian at the post says he recollects in his childhood hearing the grown-up people talking of it having flooded its valley, but he does not think it was as high then as it was last season. The water at its highest was eight feet at the company's flagpole at the post; and the surface of the ground at the flagpole was upwards of twenty feet above the river level when I was there. Now the bed of the river here is nearly 300 yards wide, and when we consider that this bed was filled up, and also the immediate valley to a depth of six to eight feet and nearly a mile in width, we can form some idea of the volume of water coming down a stream less than 300 yards in width. All the buildings at the place were submerged to the second floor, and all the residents had to flee to the higher lands until the flood abated. Much damage was done to the buildings and the property in them, as there was not time nor facilities to remove it. The Roman Catholic church at the place was removed bodily and scattered along the banks of the Liard, as also was the Mission residence; they were situated on lower ground than the company's buildings. Evidence of this flood was found all along the East Branch, in the form of mud and debris all through the woods.

About forty-five miles above Nelson a small river flows in on the west side; it is not more than thirty yards wide at the mouth. The current is swift, and there is a considerable volume of water in it. My Indians delineated its course for me, which shows it to flow in the same general direction as the East Branch, out of quite a large lake, which they said was not very far from the main river. I understood from them that they could cross, and often had, from the East Branch in less than a day. I understood from them that this lake was a good hunting and fishing ground. I could not learn its name or extent, but I understood they called it simply their lake, and it was ten or fifteen miles long and nearly as wide. As I could not understand their language nor they mine, it was difficult to get any definite information from them.

About ninety-one miles above the Fort what is known as the forks is situated. The east branch is the smaller, and is known as the Nelson River; the west one is the Sicannie Chief River. My course lay up the latter. From an Indian I met at Nelson, and who had been much on the east branch mentioned and also on the headwaters of Hay River, I got a good deal of information concerning both. Regarding the so-called Nelson, or east branch of this fork, he says he has been up it to the head. He describes it as very shallow, except in spring; so much so, that it is only in spring there is water enough to run a canoe down it. At the head it is wide and full of gravel bars, which in summer time absorb all the water, so that the channel is dry. From the head of canoe navigation on this stream down to Nelson takes about three to four days in high water, or say one hundred and fifty to one hundred and eighty miles. He says he once made a trip to Peace River from the head of canoe navigation on this stream, and described his route as being southerly for one day to a lake of considerable size, thence from the lake to Peace River three days on foot, which probably would make it from fifty to seventy miles from the head of this stream to Peace River. Between the lake and Peace River he crossed a ridge of hills, which he designated mountains, but they were all heavily timbered. His object was to trade at a post on Peace River, which was probably St. John, but he did not know the name of the place or of any one about it by which it might be identified.

This man frequently crossed from Fort Nelson to Hay River. He described several routes, the first of which goes direct from the post in a south-easterly

direction to a pretty large lake, out of which a stream flows into Hay River. The distance from Nelson to the lake is about sixty or seventy miles; the lake, as he described it, is about twenty-five miles wide, circular in shape, and distant about thirty miles in a straight line from Hay River. His distances seemed to me excessive, or, rather, the time taken to travel over them from which I inferred them, but he insisted that they were correct. He has frequently gone down Hay River to what is locally called the "Horse-track," that is the portage route from Hay River to Peace River, which latter it touches at Vermillion, but has never been farther down. A short distance below the creek which drains the forementioned lake, a small stream enters Hay River from the south-east, which he called Con-ne-taze or Dry River; it appears to be unimportant. A short distance below the Hay River enters a large lake called Hay Lake, which cannot be less than thirty-five or forty miles long, if his account of the time taken to travel from end to end of it is reliable. The width, too, would appear to be considerable, as he said the woods appeared blue in the distance on both sides when you were in the middle of it. This would imply twelve to fifteen miles at least in width. He described the lake as shallow and sedgy, with much hay around its shores.

Not far below this lake a stream of considerable size enters from the south-east, which he called Chin-cha-gah River. He could not give any exact idea of the time taken to travel from Hay Lake to the Horse-track, as he apparently had never gone directly down it, having always hunted on his way down.

Another route is to follow up the east fork a short distance above the forks to where a stream enters from the east; up this we go a half day or so, when another half day overland will take us to Hay River. This appears to be the route the Indians generally go when going from Nelson to Hay River, as many of them appeared to be familiar with it, and advised me to take it in preference to the route I came. Some considerable distance above this on the east fork it and Hay River are so close together that there is only a half-day portage (about seven miles) from one to the other. My informant had never been above this on Hay River, but had often been from here down to the Horse-track on it, and described that much of it as being perfectly clear of rapids or bad water. This must be considerably over one hundred miles.

Above the Forks, the west branch, called the Sicannie Chief River, trends from a generally south-easterly course to southerly for a distance of about forty miles, when it swerves to the westward, and continues so for about twenty-five miles, when it turns sharply to the west, and continues so to the Rocky Mountains forty or fifty miles. In this I refer to the course of the valley ascending the river.

As far as practical use is concerned, except for floating timber down, all those streams above Fort Nelson may be considered out of the question. A powerful light draught stern-wheel steamer might in good water ascend as far as the forks, but certainly not farther; in low water she would not be able to get nearly as far up. A marked peculiarity of this stream is the nature of the bars in it. They consist principally of sand, and many of them are continually shifting their position. By putting a stick down to the bottom in very many places along the river the bottom can be felt in violent agitation, the sand rolling along with great force and lodging in the deep places, only to be dislodged again in time. Many of the bars are very treacherous, presenting a solid appearance which is far from real; on top of them there is a thin crust of gravel, which will not support a man, and through which he will sink in quicksand two or three feet. To cross one of these is quite an undertaking, as it is exceedingly fatiguing, if not dangerous. Much of the bottom of the river is in the same condition. The route the Indians follow to Peace River continues up this stream to the falls, which are situated near the mountains.

A short distance above the falls a creek flows in from the south; the valley of this creek is followed up to a lake about a mile across. From the lake the course is southward to a small stream down which they went in their canoes or a raft. This stream soon enters a small river, which flows into Peace River, this river is known as Half-way River, from the fact that it enters Peace River about half way between Hudson's Hope and Fort St. John on that river. All the Indians agreed that it took

about four days to descend from the portage to Peace River, and that the descent was somewhat dangerous from many sudden turns, shoals and large rocks in the way; but as they generally descend it in small canoes made of spruce bark, which are very small and very weak, without mishap, I do not think it can be as serious a matter as they try to represent it. A word or two about these canoes may be of interest. They are made of the bark of the ordinary spruce, or, as it is known in the country, "pine." A tree of suitable size is selected; the bark is cut around near the ground and at a height sufficient to make the canoe the requisite length; a cut is then made from the top to the bottom of this section and the bark peeled off. The ends of this piece are then doubled and sewed, and a suitable gunwale and frame of willows fitted in and sewed to the bark; the seams and knot-holes are then filled and gummed, and the craft is ready for sailing. A couple of Indians can complete one of these in half a day. As a rule they do not intend them to carry more than one man and his hunting outfit, but many of them are large enough to accommodate two to four people. They are only intended to last one journey, and are very seldom taken up stream. When an Indian party in this region starts out from a post on their hunts every member on the party (dogs included) has to pack on his or her back part of the party outfit. In this way they make their way to their hunting grounds. In the spring or summer, when they wish to descend the rivers to their several posts, they make their way to some point where there are suitable trees, make their canoes and descend in them to the post, abandoning them on their arrival. Sometimes the frame and stitching is taken out of them and they are utilized as covering for buildings. They are very weak and will not stand much rubbing on the bottom, as very little force puts a hole in them or cracks them. Unless kept in the water continuously they soon become dry and brittle, when their use as boats is gone. Very few of them exceed six or eight inches in depth midships; consequently they cannot be expected to sail in very rough water. Birch bark cannot be obtained in large enough pieces nor in sufficient quantity, or this poor material would never be resorted to.

On the 7th October I left Sicannie Chief River about two miles below where its valley turns sharply to the west as already mentioned, and struck south-east through the woods for St. John, on Peace River. As three men could not possibly carry all my outfit, I was forced to leave nearly all my instruments, books, clothing and a double-barrelled shot gun behind; my men had also to leave some of their clothing. I intended as soon as I got to St. John to hire Indian help and send back to this point and bring the stuff out, so did not take the same care I would have done had I expected it to remain here the length of time it will have to. About 30 feet above the then water level four suitably situated trees were selected and cut off about eight feet high; a staging was erected on this, on which the canoe was put bottom up and tied down to it; the stuff was then put into the canoe and tied there.

Where we left the river the valley is a cañon between 1,200 and 1,400 feet deep; egress from the valley is only possible where a creek or ravine cuts through the steep sides. Up the valley of a creek which enters just where we left we clambered, but between the difficulties of ascent and our heavy loads, which averaged seventy-five pounds per man, we made such slow progress that it was nearly three o'clock when we reached the summit. In many places we had to literally drag ourselves and load up with our hands. That evening we camped in sight of the river valley, and so near to it that we could hear the roar of the rapids in the calm evening air. On the 8th we got fairly started on our journey. Our outfit consisted of about twelve days' provisions for each man, sufficient bedding, some clothing, an axe, rifle, eighty rounds of ammunition, and instruments necessary to determine our position as we progressed, also a small photographing camera.

The route proved much more difficult and longer than I expected, and a couple of days' rain and snow retarded our progress so much that it was the evening of the 21st before we reached St. John. Our condition was anything but pleasant until we saw the post; we had eaten the last of our food at noon, and game was scarce and our ammunition very short; our clothing was torn to rags, one of the party actually having no pants, and we had no idea where St. John was until we saw it, and fortu-

nately for us we struck the river right at it. The tenth day from Sicannie Chief River our provisions ran so short that we had only six pounds of bread, all our dried meat, beans, tea and sugar being exhausted. I divided the bread into four days' rations, intending to eke it out with such game as we could secure, but this proved so scarce that all we could get was a dozen or so partridges, some squirrels and a muskrat or two. The result to myself was a loss of fourteen pounds in weight, and the other members of the party were correspondingly lighter and weaker. The distance in an air line from where I left Sicannie Chief River to St. John is $92\frac{1}{2}$ miles, but we must have travelled upwards of 140. Our course was anything but straight, as we often had to make long detours to pass swamps and brûles.

Not far from Sicannie Chief River I crossed many creeks, which all seemed to be running to a common point. As we progressed southward the valleys of these creeks were deeper and the streams larger; many of them proved troublesome to traverse. Between twenty and twenty-five miles in an air line from Sicannie Chief River we traversed quite a large stream in a deep valley; it was fully 100 yards wide, but shallow, yet there was quite a volume of water flowing in it. Just above where we crossed it, it was joined by a large creek flowing from the west; the main stream, as far as I could see up the valley, came from the south-west.

Before reaching the Peace River I crossed nine creeks, two of them quite large. Some of the Indians I met at St. John professed to know this country well, and assured me that all those creeks flowed into the river mentioned, which they affirmed was Pine River of the north, which flows into Peace River twenty-five miles below Fort St. John. They further assured me that all the streams I crossed between it and Peace River flowed into it before it joined the latter, and certainly I saw no stream entering Peace River between St. John and Pine River, according in size with some I crossed within a few miles of the latter stream.

About fifteen miles from where we crossed Pine River we struck the valley of quite a large stream, which flowed south-easterly. We kept down this valley for three days. I may say here that we found many Indian paths and horse trails along our route, many of which we would follow for a considerable time, when we would lose them in a large swamp or piece of prairie, or we would find them going so much out of our direction that we would abandon them. When on those trails we had fair footing, but they frequently took us long distances in a direction contrary to that we ought to go, and we wasted much time looking for them when we lost them, so they did not prove an unmixed blessing to us. Many of them are well cut out and beaten, and many of them no doubt lead from one hunting ground to another. Most of those trails run along the streams.

After following the above mentioned stream for three days it became quite large, but then suddenly turned sharply to the eastward down a narrow deep valley whose sides were too steep and rough to travel on. We abandoned it, continuing our south-easterly direction for a little over a day, when we again struck a large stream, which the Indians at St. John told me was the same one we had followed for the previous three days. We continued down this for another day and a half, on which portion of it there is a lake six or seven miles long and about a mile wide, when it turned sharply to the east and continues, so the Indians say, until it joins the Pine River; in fact, this is what has hitherto been marked on our maps as Pine River though it would appear from this that it is only a branch of it. Quite a large stream joins this about thirty miles north of Peace River, flowing from the west.

On my arrival at St. John I found all the Indians who hunt and trade in the vicinity camped around the post. From some of them who appeared to know the country well I got some information concerning the part of it north of the fort. I made a sketch map of my track from Sicannie Chief River to St. John, and two or three of them recognized the principal features on it, and gave me the names I have already given. In addition they directed me in making a sketch map of the water system lying north-east of the fort. Their information was that about forty-five or fifty miles N.N.E. from St. John, as they pointed, there was an extensive ridge which they designated mountains, though by the way every hill is a mountain with them.

As they marked it the ridge lies north-west and south-east, and extends twenty-five or thirty miles. They said Battle River, which flows into the Peace nearly three hundred miles below St. John, originated in a large swamp extending south-east of this ridge; many small creeks flowed out of this swamp in an easterly direction; these soon joined and formed a quite large stream, along which the country as far as they were down it was comparatively dry, with occasional patches of prairie and meadow land along its banks. To the east of this ridge another stream originates in a similar manner. This they said, they had learned from other Indians, ran very far into a large lake, and from a part of it Indians used to cross to Peace River over a long portage. They believed it was Hay River, though not known to them by that name. An extensive swamp lay along the north east slope in which are many lakes, some of them as much as five to seven miles long. Out of these lakes streams flow north-westward and unite in a stream which they said flowed northward into a large river on which were some posts where other Indians they had met went to trade. This is probably the stream known as the Nelson, of which I have already given a description furnished me by an Indian at Fort Nelson. It will be seen that the characteristic features mentioned are common to both accounts.

At St. John I engaged the services of two horses, and after a couple of days also got three Indians reluctantly to consent to accompany my two men back to the cache on Sicannie Chief River; taking the horses with them as far as they could, which would be at least within twenty miles of the cache, and one of the men engaged said he knew a way by which they could get within seven or eight miles of it, leave the horses in charge of one of the party while the others went on and carried back the stuff to them, leaving the canoe where it was. Indian-like it took two days more to get them started; they were continually making new demands on me, and representing the dangers and hardships they would have to suffer, for which they thought I as a "Big Chief" ought to pay for handsomely. They have the most extravagant notions of the value of their services, and grade the value and importance in proportion to the rank and wealth of their employer. At length, after a long vexatious pow-wow of nearly three days' duration, they were got off in the afternoon of the 25th. They accompanied my men just a day and a half when they sulked and refused to go any further, notwithstanding that they had been more emphatic than the others in their denunciations of the Indians who had deserted us on the East Branch River; all the camp expressed much displeasure at the conduct of those men, alleging that they would never be guilty of such meanness, and made some uncomplimentary allusions to them. After being convinced that they would go no farther, one of the men rode back to the post and tried to get others to take their place, but this was found impossible; when he had to return to his companion and bring him in. In any case they would not have been able to proceed, for the following day a heavy snow storm set in which continued several days and so much snow fell that the horses would not have been able to proceed. Had the Indians continued for another day or two they would have been quite justified in turning back, as it was they betrayed their true character without an excuse.

Meantime after their departure I began to make preparations to descend Peace River to Dunvegan and Smoky River, thence *via* Lesser Slave Lake and Athabasca Landing to Edmonton; taking the necessary observations as I went. At Edmonton if my men had not then overtaken me I would make the necessary preparations for them to come home. In this way I hoped to save some time, for my services were not required to find the way back to the cache while they were indispensable in taking the observations, which we might assume would occupy many days by reason of unfavourable weather. I purchased a canoe and was about to start on Monday afternoon the 26th October, when a trader's scow was seen drifting down the river on its way to Vermillion about five hundred miles further down. Shortly after this a raft came down, both scow and raft landed and remained over night, and I decided to leave my canoe for my men to come down in when they returned. On the morning of Tuesday the 27th, I started down river on the raft, which belonged to the sons of the Rev. J. G. Brick who resides at Smoky River, who were going home after a trip up to the mountains.

I afterwards learned that I was not much more than out of sight of the Fort when my man returned to tell that the Indians had deserted him, and to try and secure others as already mentioned. I was not more than six or seven miles from the Fort when it began to snow and continued to snow all the way down to Dunvegan, where we arrived late in the evening of the 29th. The second day from St. John ice began to form in the river, and soon increased so much that it was running full from shore to shore. I had intended making a rough survey of the river from St. John to Dunvegan, but the snowfall was so heavy that we could very seldom see the shores of the river, which put a survey out of the question. With so much ice drifting it was very difficult to do anything with our craft, and often we had much difficulty in keeping her in the channel. The afternoon of the 28th we drifted past the scow which soon after, in the gloom of the evening, drifted on to a gravel bar, on which it was driven hard and fast. It took the owner and his crew of four men nearly three days to get off it. I will here remark that there are few more unpleasant employments than sitting on a raft or boat shivering with cold, listening to the unceasing grinding and crunching of the ice as it drifts slowly along. This ice drift is common to all northern rivers, and generally continues from two to four weeks before it sets fast. As it drifts along, portions of it drift on to and become attached to the shore; other portions become attached to this and thus a fringe of ice gradually forms along both shores, which widens until there is only a narrow channel where the swiftest current is in which the ice continues to drift until it jams, when it sets. It often happens that these jams are burst by the force of the current and carried down the river, taking with them all the ice in the river which may drift several miles before it is stopped. The result is that in winter the northern rivers present anything but a smooth glassy appearance, in fact it is often difficult to cross them on account of the height and roughness of the piled up broken ice; the only footing being close to the shore.

At Dunvegan I had to wait until Tuesday the 3rd of November, before I could procure a horse and sleigh to take me down to Smoky River. I spent most of this interval in reading old journals and gathering information, some of which will appear in its proper connection. I also took some observations, which will also be touched on in its connection.

I arrived at Mr. Brick's Mission, near the mouth of Smoky River, on the afternoon of Tuesday the 5th November. Here I had to remain until Wednesday the 18th, as there was no practicable way of getting across the river, the ice drifting so thickly.

On the 13th my two men overtook me, having made their way from St. John to Dunvegan in my canoe, and from Dunvegan to Mr. Brick's overland.

On the 18th I went down to Peace River crossing, but found it impossible to cross. The ice having set the previous evening and was not strong enough to carry a man. I was therefore compelled to remain on the west side of the river that night. The night proved cloudy and mild, and the ice was not much stronger in the morning, but with care one could pick his way by keeping where the drift-ice was thickest and heaviest. Our stuff had to be dragged over, as we were afraid to trust ourselves with the extra weight on the ice. For safety, each man carried a long light pole under his arm, so that should he drop through he would if he held to the pole not disappear under the ice. As soon as we crossed I sent a man on foot to what is known as the "Cattle Sheds," about 30 miles distant on the road to Lesser Slave Lake to get a team and sleigh to take us and outfit to the latter place. The team arrived on the evening of the 20th, and the next morning we left for Lesser Slave Lake, where we arrived on the night of Monday the 23rd.

As it was absolutely necessary that I should get some observations here and the weather proved unfavourable, I had to remain here a week, leaving on the forenoon of Tuesday, 1st December. To carry our baggage and help us along we took two dog-teams with which we reached Athabasca Landing the evening of the 7th. The distance is about 175 miles.

I remained at Athabasca Landing the 8th, 9th, 10th and 11th, as I could not obtain transport to Edmonton. I obtained some observations here. The morning

of the 12th I left the Landing with my party and a teamster and team belonging to the Hudson's Bay Company; as the weather was fine and the roads good we made good time, and pushed our team so much that we reached Edmonton at ten o'clock in the night of the 13th. Here I paid off the man I had engaged here in the summer, and attended to some matters connected with my work. As it was necessary that I should get some observations here, and I did not get them in time to start for Calgary on the train on Wednesday the 16th, I had to remain over until the 18th, there being only two trains per week to and from Edmonton. This finished the account from and to Edmonton. As the rest of it is only ordinary routine travelling, it possesses no interest here.

GEOGRAPHICAL POSITION OF THE PRINCIPAL POINTS VISITED.

Before leaving Ottawa I was given two pocket chronometers by the Surveyor-General, Frodsham No. 9699, and Barraud & Lund No. ³²³25; in addition, I had my own, Jones No. 78288. I carefully rated these before I left Ottawa, but found their rate unsatisfactory, especially the Barraud & Lund. I intended to use these to find the longitude of the points I would observe at from the difference of time between the starting point and the several points. I intended the starting point to be Edmonton, and the known difference of time between there and Ottawa would also give me an idea how chronometers behaved while travelling, but unfortunately while at Edmonton the weather was too wet and cloudy to obtain the necessary observations, I was too much hurried to delay and get them, and I was the less anxious as I expected I might get some at the Landing, and make it my reference point and determine its position on my way home when I would have plenty of time. At the Landing I was again unfortunate in having cloudy weather, as I also was at McMurray, so that I did not get any observations until I reached Chipewyan. I deduced a rate for the chronometer by observing at both ends of the instrumental traverse I made on Great Slave Lake, and from the traverse, deducing the difference of longitude of its terminal points. By making the best adjustment I can of the rates between Ottawa and Chipewyan; the longitude of the latter place referred to Ottawa stands by the three chronometers thus: Frodsham $111^{\circ} 08' 16''$, Barraud & Lund $111^{\circ} 11' 45''$, and Jones $111^{\circ} 11' 10''$; mean $111^{\circ} 10' 24''$. The longitude given by Sir J. H. Lefroy in his diary of a magnetic survey of a portion of the Dominion of Canada is $111^{\circ} 18' 40''$, which he says is the mean of Franklin's, determined in 1820 and 1826, which is deduced, I presume, from lunar distances. I could in no way deduce from my chronometers the latter value and as lunar distances are, as a rule, not very reliable, I have assumed the former value as the longitude of this point and made it my reference point. The latitude deduced from circum-meridian altitudes of stars I found to be $58^{\circ} 43' 02''$. Lefroy determined it in September, 1843, and July, 1844, the values respectively being $58^{\circ} 42' 58''$ and $58^{\circ} 43' 09''$, mean $58^{\circ} 43' 03.5''$. He quotes Franklin's as $58^{\circ} 42' 35''$.

From Chipewyan the rate of my chronometers, when compared with each other, is fairly good. At Fort Smith I observed and found the latitude $60^{\circ} 01' 51''$. The longitude referred to my position of Chipewyan as given above is by Frodsham $111^{\circ} 56' 03''$, Barraud & Lund $112^{\circ} 02' 17''$, Jones $112^{\circ} 01' 56''$, mean $112^{\circ} 00' 05''$.

Resolution on Great Slave Lake I found latitude from circum-meridian altitudes $61^{\circ} 10' 35''$. Lefroy in 1844 made it $61^{\circ} 10' 42''$, and Franklin in 1825 $61^{\circ} 10' 26''$. Franklin's longitude same year $113^{\circ} 45' 00''$, and Simpson's in 1836 $113^{\circ} 48' 00''$; mine referred to the position of Chipewyan—Frodsham $113^{\circ} 49' 32''$, Barraud & Lund $113^{\circ} 55' 16''$, Jones $113^{\circ} 50' 45''$, mean $113^{\circ} 51' 51''$.

The mouth of Hay River on the east bank about a fourth of a mile up from the lake I found latitude $60^{\circ} 51' 40''$, longitude by Frodsham $115^{\circ} 56' 01''$, Barraud & Lund $116^{\circ} 01' 15''$, Jones $115^{\circ} 58' 25''$, mean $115^{\circ} 58' 34''$. This is much farther west than Lefroy places it, his position being $115^{\circ} 18' 00''$ which appears to be by account. Our longitudes of Resolution only differ about seven minutes or about four miles. Now the difference of longitude between Resolution and Dead Man's Island deduced from my micrometer survey which must be within a very little of the truth is $0^{\circ} 40' 03.7''$ which would locate the latter point in $114^{\circ} 31' 54.7''$, giving

about forty-seven miles between the assigned positions of Dead Man's Island and Hay River, which I know from the times taken to paddle over that portion of the lake both in 1888 and 1891 is not far from the truth, as it took the best part of two days in both cases, so that I feel no hesitation in adopting my own locations though it is dependent altogether on the going of my chronometer which was not as satisfactory as might be desired.

Fort Providence I found in latitude $61^{\circ} 20' 38''$ from circum-meridian altitude of stars; longitude by Frodsham $117^{\circ} 54' 46''$, Barraud & Lund $118^{\circ} 00' 45''$, Jones $117^{\circ} 57' 41''$, mean $117^{\circ} 58' 43''$. I can find nothing in Lefroy that would serve to indicate the position of the present site of the post. Between Providence and Simpson I determined the position of several points, but as they only refer to points on my survey of the river it is needless to say more concerning them.

My observations at Simpson place it in latitude, by circum-meridian altitudes of the sun, $61^{\circ} 51' 44''$; by altitude of Polaris $61^{\circ} 51' 43''$. Lefroy quotes T. Simpson's latitude in 1837, $61^{\circ} 51' 25''$; his own 1844, $61^{\circ} 51' 42''$. He quotes Simpson's longitude as deduced from a number of lunar distances $121^{\circ} 25' 15''$, but he remarks "this is about eight minutes east of the position assigned by Franklin." My chronometers stand: Frodsham $121^{\circ} 39' 55''$, Barraud & Lund $121^{\circ} 45' 39''$, Jones $121^{\circ} 43' 01''$; mean $121^{\circ} 42' 52''$. This is about nine and a half miles farther west than Simpson's observations place it and about five more than Franklin's.

Between Simpson and Liard I took many observations, but as they were only taken to fix points on my track survey of the Liard River I will make no reference to them here. My map when issued will show their position.

Liard I found to be in $60^{\circ} 14' 18''$ from circum-meridian altitudes of α Aquilæ and $60^{\circ} 13' 44''$ from altitudes of Polaris; mean $60^{\circ} 14' 01''$. Longitude by Frodsham $123^{\circ} 54' 16''$, Barraud & Lund $123^{\circ} 59' 18''$, Jones $123^{\circ} 57' 28''$, mean $123^{\circ} 57' 01''$. This post has always hitherto been marked on our maps as being in British Columbia, but it is about sixteen miles north of the northern boundary of that province. Mr. McConnell of the Geological Survey visited this post in 1887, and appears from his map to have found the latitude about the same as mine, and when we allow for the difference of position at Simpson mentioned above, his longitude is also very close to mine.

My camp on the East Branch River, at a point about three-quarters of a mile above its confluence with the Liard, I found to be in $59^{\circ} 31' 18''$ from circum-meridian altitudes of α Aquilæ; and longitude from Frodsham $124^{\circ} 29' 16''$, Barraud & Lund $124^{\circ} 30' 02''$, Jones $124^{\circ} 29' 40''$; mean $124^{\circ} 29' 39''$.

Between the mouth of the river and Fort Nelson I obtained observations to fix points on my survey, but, as in the case of the Liard, I will only give the results on my map.

Fort Nelson I found in latitude by circum-meridian altitude of α Aquilæ $58^{\circ} 49' 38''$, by altitudes of Polaris $58^{\circ} 48' 59''$; mean $58^{\circ} 49' 18''$. Longitude from Frodsham $122^{\circ} 53' 53''$, Barraud & Lund $122^{\circ} 56' 30''$, Jones $122^{\circ} 55' 55''$; mean $122^{\circ} 55' 06''$.

At the camp where the Indians deserted me, as already narrated, I determined my position to be latitude $58^{\circ} 17' 25''$; longitude by Frodsham $122^{\circ} 18' 01''$, Barraud & Lund $122^{\circ} 19' 15''$, Jones $122^{\circ} 18' 47''$; mean $122^{\circ} 18' 41''$. This point is about four miles north and about five miles west of the confluence of Sicannie Chief and East Branch Rivers.

I determined the position of a point on the river in $57^{\circ} 43' 25''$ latitude, and $122^{\circ} 40' 46''$ longitude by Frodsham, $122^{\circ} 46' 00''$ by Barraud & Lund, and $122^{\circ} 44' 25''$ by Jones; mean $122^{\circ} 43' 44''$.

The point where I left the river for Fort St. John is in latitude $57^{\circ} 31' 30''$, and is, I would judge from the direction of the river, not more than a mile west of the last mentioned longitude.

Between Sicannie Chief River and Peace River I determined seven latitudes but no longitudes.

I determined the longitude of Fort St. John from the difference of time between it and Dunvegan, the position of which was fixed by accurate survey connection

with the system of Dominion Lands surveys. In the interval between Sicannie Chief River and Peace River my chronometers had to be carried on my back, and they were subjected to much rough jolting and shaking, so that they could not be expected to fix St. John with reference to Chipewyan with anything like the same degree of accuracy as when they were carried in my canoe with very little shaking.

The latitude of St. John from circum-meridian altitudes of ϵ Pegasi is $56^{\circ} 11' 32''$, and from altitudes of Polaris $56^{\circ} 11' 12''$; mean $56^{\circ} 11' 22''$. The longitude from the chronometers referred to Dunvegan stood, Frodsham $120^{\circ} 52' 34''$, Barraud & Lund $120^{\circ} 53' 17''$, Jones $120^{\circ} 53' 02''$; mean $120^{\circ} 52' 54''$. The interval between the observations at the two places was nine days.

The position of Dunvegan, as deduced from actual survey, is: latitude $55^{\circ} 55' 38''$, longitude $118^{\circ} 36' 32''$. I observed at Dunvegan and Lesser Slave Lake and Edmonton for the purpose of finding the rates of the chronometers.

The position of Lesser Slave Lake Post flagpole, as W. T. Thompson gives it in his notes of a traverse survey between the 5th and 6th meridians in 1882 and 1883, is, latitude $55^{\circ} 32' 59.9''$, longitude $116^{\circ} 11' 18.6''$.

The latitude of Athabasca Landing I found to be $54^{\circ} 42' 31''$, and the longitude referred to Edmonton (mean of three chronometers) is $115^{\circ} 15' 48''$. The interval between the Athabasca Landing and Edmonton observations was six days.

RESOURCES OF THE DISTRICT.

As I have already reported twice on the Athabasca and Peace River basins and the Mackenzie once, it will not be necessary to now refer to them as specially as if they had not been before described: In the case of the Peace River, I visited a part of it last season which I had not before seen, that is, that part of it between St. John and Dunvegan, and also gathered much general information regarding it. I also gathered from the Hudson's Bay Company's journals at St. John and Dunvegan, many useful facts concerning the seasons, which I also did at Fort Liard and Fort Nelson. Fort Simpson has already been noticed in my report for 1889, but I will insert here so much as will make this connected and intelligible, as I also will do in the case of Forts McMurray and Chipewyan.

Timber.

First in this connection I will notice timber. On the Athabasca, from the mouth of the Pembina down to Fort McMurray, the valley is narrow and from two hundred to three hundred feet deep. In the bottom of the valley there is much spruce and some poplar that would make fair lumber. On the uplands, as far as I saw, there are many places where a similar quality could be obtained, but as a rule the trees are much smaller than people in the Eastern Provinces are accustomed to see made into lumber, though they would compare favourably with those used in the other parts of the Territories. From McMurray down to the lake the banks are lower and the valley wider, until near the lake there are little or no perceptible banks. Here there is much fine merchantable spruce, but unfortunately it cannot be brought to market without the aid of a railway, the streams in the country flowing in a contrary way. This objection does not apply so forcibly to that part of this river above Athabasca Landing, as all the timber above this point and on Lesser Slave River and lake, could readily be floated down to this point, and as it is only about ninety-six miles from thence to Edmonton by the cart trail, and it is probably the point where the first railway north of Edmonton will cross the Athabasca River, its timber resources stand a chance of being utilized much earlier than those on the lower river.

I am sorry to say, however, that long before it will be necessary to resort to this, much of it may be burned, as such is the case along the trail between Edmonton and the Landing.

In 1884 I passed over this trail twice and then saw many groves of fine spruce, but last summer I saw that much of the best of this timber had been completely burned off. Then the country in the immediate vicinity of the Landing was all heavily timbered, much of it merchantable. Last summer, especially in the

Ta-wat-an-a Valley and vicinity, the country resembled prairie nearly as much as the country in the immediate vicinity of Edmonton does.

As there is no very pressing necessity for any one to settle at present and the timber will yet be valuable, it is a pity that fires should make such havoc, but under existing conditions it is impossible to prevent them. On Great Slave and Lower Peace rivers there is also much timber of value, but being on the Arctic water system it will be long before it will be a commercial asset. The same remarks apply to the timber on the Great Slave Lake and Mackenzie River of which quite a large percentage could be utilized.

The timber in the valley of the Liard and East Branch deserves special mention. Although I was led to expect large trees in the valleys of these streams I did not expect to see so many of such large size.

All the way from the Mackenzie up to the forks of the East Branch and Sicannie Chief River a distance of nearly 450 miles by the streams, there are many and large extents of large and good spruce, which would make better lumber than any other I have seen anywhere in the country. The cottonwood or balsam poplar particularly grows very large. On the East Branch many trees of that variety were seen more than three feet in diameter at the ground. At Fort Nelson there is an extensive flat thickly grown with spruce and poplar of this kind, I selected a medium tree of the latter species, cut it down and found the following dimensions: diameter at stump exclusive of bark, twenty-nine inches, diameter exclusive of bark at first limb, seventeen and a half inches, length from top of stump to first limb, ninety feet, number of rings of growth 149. The bark will add at least four inches to the diameter, as it is very thick and light. It has often occurred to me that the bark of this wood would answer many purposes to which cork is applied, as it resembles it somewhat in appearance and lightness, but is not as a rule nearly so soft.

As the timber on these streams is also on the Arctic watershed, it may be said to be beyond the pale of present utility.

Along my track between the Sicannie Chief and Peace Rivers I did not see much timber that could be used except for fuel and fencing, should such ever be required in the country. That near the Sicannie Chief River is generally scrub, much of it very small and very thick, so much so that it is very difficult to make one's way through it, though it does not average more than a couple of inches in thickness and eight to ten feet in height.

There are occasional ridges where Banksian pine grows six to ten inches in diameter and forty to fifty feet in height, but they are of no practical use. There are also occasional groves of poplar which would serve well for building logs.

As we near the Peace the trees get larger and more suitable for lumber, though still a very large percentage is only scrub. Much that I saw could be floated down Pine River and its branches into Peace River.

The prevailing timber here, as elsewhere in the country, is spruce; occasionally a grove of good poplar is seen, and in a few places I saw Banksian pine, tall, of good diameter, and clean trunked enough to afford two or three good logs to a tree.

Very few birch were seen, and those seen were generally less than half a dozen inches in diameter and scrubby.

On Peace River, between St. John and Smoky River, on many of the flats in the river bottom a good deal of good timber could be procured, but I fancy not much more than may prove requisite for the needs of the district in the future. In any case, without railroad communication it is of no utility to the settled part of the Territories even if required, and even with it I am sure better and cheaper lumber can be brought in from other parts of the country. As far as I could learn and see of the uplands on both sides of the river, there is not a very extensive supply of merchantable timber on them, there being much prairie and swamp, with the timber generally too small for other use than fuel and fencing.

On the road between Peace River crossing and Lesser Slave Lake, though there is much bush, there is not very much timber fit for lumber to be seen; and I suppose it is a fair sample of the whole district. It is true a vast amount of lumber

could be got out of the tract, but it would prove small compared with the surface it was taken off. I would judge from the appearance of the woods around Lesser Slave Lake that a large quantity of lumber could be got from that vicinity, and the facilities for getting it to Athabasca Landing are good and inexpensive—namely, down the Lake and Lesser Slave River to the Athabasca, thence to the Landing.

There are several streams entering the lake on both sides which would doubtless afford access to timber many miles from the lake. As the disintegration of some kinds of wood into pulp and its conversion from that into various commodities is an accomplished fact, it may be that the wood peculiar to these regions may yet be utilized for that purpose. I have been informed that the wood of the balsam-poplar, commonly called cottonwood, makes very good pulp for the manufacture of paper, and it may be that the large forests of it in our northern regions may yet be used for that purpose. The spruce does not appear to me to be of the quality supplied to the E. B. Eddy factory in Hull, P.Q., for the manufacture of articles made there, but it may be that it will, with a modified treatment, suit. However, as I have already said, the utilization of the timber in all this district depends entirely on railway communication with the settled parts of the country, which is a question for the future to determine.

In the information I got from Count de Sainville concerning the country around the delta of the Mackenzie, he says there is no timber of any useful size near the coast.

The Caribou Hills, which extend along the easterly shore of the estuary, are partly timbered with small spruce. These hills are, he says, about 1,200 feet above the sea at the south end (of which he did not give the location); extend about thirty-five miles north and south and about twenty east and west. They decrease in height northward until at the north end they are not more than two hundred feet at the Arctic Coast.

The principal growth along the coast is a species of willow.

In May 1890, Mr. McKinlay, H. B. Company officer in charge of Fort Resolution made a journey in company with Mr. Pike to the so-called "Barren Lands" north of Great Slave Lake. While at his post this season I got pretty full notes from his dictation of his trip. He has since then very kindly sent me out the journal kept by him while absent on this expedition, and from both I will cull such information as may be relevant to a report of this nature. None of the party took any observations to determine the position of any of the points visited, and as I understood him they simply identified their location from the outlines of lakes and trends of streams as marked on a map they had with them. I will give a full account of this trip later on, but here I will just refer to Mr. McKinlay's remarks on the timber in that region. The country north of the lake "is just like that north of Fort Chipewyan on Lake Athabasca, and you know what that is like." From this description I cannot say that there is much timber of value on it. He said the timber such as it was, continued to about fifty miles north of the lake; here the timber thins out and soon disappears with the exception of a few clumps of spruce in very sheltered places. In many sheltered spots there are clumps of spruce which would be suitable for building logs. They did not succeed in getting farther down than the Back or Fish (or as Bishop Bompas of Mackenzie River district says it ought to be called "Big Fish") River, then Beachy Lake when adverse circumstances compelled them to return. Along Back or Big Fish River and Beachy Lake only willows were seen and those only occasionally. They do not as a rule grow more than five or six feet high. This gentleman has lived in the country a great many years is said to be able to converse in all the native languages, and has travelled over it a great deal, taking a general interest in all the parts he has visited; I think therefore any remarks he may have to make on questions of this character are entitled to every consideration. The prevailing timber here is spruce and Balsam pine.

Minerals.

The rocks and geological features of the Athabasca, Mackenzie and Peace Rivers have been so often and well described that there is no occasion to refer to them here.

in detail. I shall therefore only make such remarks concerning them as will serve to make this account intelligible.

On the Liard at the confluence with the Mackenzie the "Gros Cape" rises between 100 and 200 feet above the water, but as it is only clay and boulders it possesses no economic interest. At the foot of the rapids some black clay shale crops out, and along the rapids high precipitous rock cliffs occur, much of this appears to me to be calcareous sandstone with occasional exposures of shale of a greyish colour. About eighty miles above Simpson close to the water's edge on the right bank of the river I noticed an exposure of shale which could be easily separated into plates, which were quite hard and close grained. In some places I saw where plates nearly two feet square could be got out quite easily. I brought small specimens of this away, but they were left with my canoe and outfit on the Sicannie Chief River. It appeared to me that material of economic value could be got out of here. The Mountains come quite close to the river at Nahanni River, but I did not go to see them, so can say nothing of the rocks there. Several places I noticed scarped sand and clay banks rising thirty to a hundred feet above the river. About twenty-three miles below Fort Liard a high rocky ridge runs along the easterly side of the river for a short distance, it appears to me to be a spur from the Mountains which are not more than four to six miles distant on the west side. The rock appeared the same as that seen in the Mountains. At the mouth of Muskeg River a rock cliff about 100 feet high was seen on the east bank, but I was not close enough to see what kind of rock it was. About twelve miles below the mouth of the East Branch a rocky peak rises 500 or 600 feet above the river on the east side, I did not get close enough to observe the character of the rock. Many similar peaks rise along the west side at the foot of the Mountains. Those who wish to see a complete description of the geological features along this river can do so by getting a copy of Mr. R. G. McConnell's report of his survey of it made for the Geological Survey Department in 1887. The report was published in volume IV., 1888 to 1889.

On the East Branch River no fixed rock is seen until we get about twelve miles above the mouth. Here on the east bank of the river a very coarse grained sandstone crops out and extends twelve or fourteen miles up the river. At the north end it is only a few feet high, but at the south end it is fully 500. There are only a few small knolls of the same rock on the west side. Those rocks present a very picturesque appearance as we ascend the river. They are weathered into castellated forms, and many grand views are presented by them as we wind our way along the river. I took some photographs, but they were left with my other property on Sicannie Chief River. This rock is very coarse grained, in fact the top layers might be called a fine conglomerate of gravel and sand, but it gets finer grained in the bottom layers until where it is highest they are a fine grained greenish-grey sandstone. It suddenly turns away from the river at the south end. On the west side farther up there is a range of hills apparently composed of the same sandstone. They rise about 500 feet above the river and in many places are weathered into castellated forms similar to that on the east side of the river. They are as a rule a couple of miles distant from the river. No more fixed rock was noticed until we got about 20 miles above Fort Nelson, where the valley of the river becomes narrower and the banks steep, in places rising sharply almost from the water's edge 600 or 800 feet above it. Wherever the rock was exposed in these hills it was a black clay shale much disintegrated that was seen, reminding me very much of the shale seen on the lower Peace River. As we ascend the river these high steep banks get higher, steeper and more a characteristic of the stream than below, in many places continuing along the river for miles, then opening out into basin-like depressions of a mile or two in width.

In this clay shale I saw many small nodular masses, and thin bands of clay iron stone, which is also characteristic of the Peace River shales. About thirty miles up I noticed sandstones overlying the shale, and as we ascend the river gets up nearer to this sandstone until about sixty miles up from Nelson this sandstone is at the water's edge. For several miles below the forks of Sicannie Chief and East Branch Rivers there is a basin-like valley of several miles in width, the banks rising in

terraces and all wooded, the only rock exposure seen being at a few points where there are sharp turns in the river. This continues for about forty five miles above the forks where the valley again narrows and is from 600 or 800 feet to 1,200 or 1,400 feet deep. The valley narrows as we get farther up, until the last ten or twelve miles I travelled up it was a cañon out of which it was impossible to get except where a stream joined it or ravine cut into it. At the point where I left the river my barometer read at the river 27.87 inches and on top of the bank 26.78 showing a rise of about 1,100 feet at this point which was in the depression of the valley of a tributary creek. About 475 feet of this consisted of black and gray clay shales much coarser and harder than that seen farther down with some thin layers and masses of clay iron stone. Above this the rock was sandstone, the bottom beds of a light grey colour, and the top ones of a yellowish shade and coarser texture. This sandstone is nearly always precipitous; three times I tried to climb to the top of it, always trying where from the river it appeared practical to ascend it but always found it impassable. All through this cañon masses of this sandstone rock, many of them of immense size, lie in and along the river. In several places I saw where large portions of the face had fallen off the cliffs and rolled down the slope of the shale quite recently. This cañon-like valley continued up as far as I could see from where I left the river, and the Indians described it as continuing up into the Mountains. In the vicinity of the falls they said it was very narrow and so deep that it was dark, but as none of them ever went near the falls of which they appear to have a superstitious dread of the vicinity, alleging that the cañon at the foot of the falls gives forth strange noises, their statements are not to be credited as they otherwise might. The Indians at Nelson described the country over which they pass from the water system of the Liard to that of the Peace as a flat country as I have already described, and the distance from one stream to the other about twenty five miles; but the Indians at St. John who appeared to me to be more familiar with that section than the Nelson Indians described the portage as being over a sharp high ridge (mountain they called it) over which it took a man on foot without a load about half a day to pass from stream to stream, the chief difficulty being in getting up and down the steep sides of the mountain which they said was all wooded with small trees. In the case of the Nelson Indians only two or three of them appear to have ever passed south to Peace River, and it may be that two different places are referred to, though they all referred to the falls as being not far from the portage. If the same place is meant I would place most reliance on the account given by the St. John Indians. The latter described the Half-way River as having many rocks in it and cliffs along it, which I infer from their description consists of sandstone.

Between Sicannie Chief River and Peace River many cliffs of this sandstone were seen along the streams, particularly where I crossed Pine River. On it cliffs of upwards of eighty feet high were seen weathered into fantastic shapes.

On Peace River what is apparently this same sandstone rock overlies a mixture of what appears to be sand and clay shales for some distance below St. John, but the snowy weather prevented my seeing much of the bank of that stream on my way down.

Between Peace River and Lesser Slave Lake no fixed rocks are seen along the trail, nor are any along the north side of the lake, nor are there any along Lesser Slave River, except bedded clay and sand can be called rock.

During my journey I kept a constant look-out for fossils, especially so on the East Branch and Sicannie Chief River, but failed to observe any trace of any, though I often made special search; I cannot say that I saw even a suspicion of one. In this connection I may state that Count de Sainville gave me a crystal which he obtained on the west side of the Mackenzie delta, but it was left in my cache on the Sicannie Chief River. It consisted of an aggregation of hexagonal crystals radiating from a globular nucleus. It seemed to me to consist of clay as it was about the same colour, but gave a white streak; it was quite soft, being easily cut with a knife. The Count described them as being quite numerous in the clay shale along the western bank of the delta. He also found in the vicinity of the delta a curious fossil which he

presented to the Mackenzie River Museum. I took the liberty of bringing it away for the purpose of having it identified or classified, but it now lies with my other articles in the aforementioned cache, and the Museum has lost a very curious and interesting fossil.

This Museum was organized in 1887 by the H. B. Company's officers in the district for the purpose of collecting and preserving specimens of all kinds of animals and birds peculiar to the country, also all fossils or curiosities, in fact anything of note or interest in connection with the country. I do not think this association of gentlemen include specimens of plants in their collections. If they did it would add much interest and value to their labours and to the world at large and their own district in particular. The H. B. Company has devoted to it the use of some large rooms in one of their houses at Fort Simpson and already they have quite a large collection of fossils, bones, Indian curiosities and implements, stuffed specimens of nearly every animal and bird to be found in the district.

Capt. Bell of the steamer "Wrigley" has proved himself quite a skilful taxidermist and must necessarily, from the number of specimens fixed, have devoted much time and study to the curing and fitting up of skins. This institution should receive aid and encouragement from all lovers of natural history and science.

The fossil I brought away from it, which was contributed by Count de Sainville, was generally thought to be a fossilized joint of the vertebra of some large fish, but it appeared to me more like some species of star fish. I have described it to several palaeontologists and examined many cuts of fossils; but so far have not been able to place it.

ECONOMIC MINERALS.

COAL.

Many exposures of this mineral are to be seen along the Athabasca, and a few on the lower Mackenzie, which have been described in several of the Geological Reports and in my reports of 1884 and 1887-88. While at Fort Liard I got an account of a very large deposit situated on the Mountains west from the Fort. My informant, a son of the officer in charge, had seen this deposit but gave me no idea of its extent other than that it was very large. He was ignorant of its quality also, but from his answers to my questions, I would judge it to be the ordinary lignite of the country. I could not gain any certain idea of its distance from the post. This young man runs around the country adjacent to the Fort a good deal in the winter, collecting meat from the Indians for the use of the post; and on some of those journeys the Indians informed him of the locality of this curious "stone," in this way he saw it, but did not pay much attention to it.

On the east branch some drift coal was seen along the stream up in the cañon. After some search I located the seam well up in the shale, not more than 100 feet below the sandstone. Where I saw it the seam was only four or five inches in thickness, and I do not think from the drift specimens I saw that it is much thicker anywhere in this vicinity. I brought out a small specimen and handed it to Dr. Dawson of the Geological Survey.

Where I crossed Pine River of the north I saw a thin seam of lignite, about the same in dimension and appearance as the aforementioned seam. It was in the sandstone not more than sixty or seventy feet from the surface. No other indications of this mineral were seen between there and Lesser Slave Lake. I was told at the east end of this lake that the Indians report coal on one of the streams on the south side of the lake. This may be true, and likely is, as I have seen many large specimens in the drift along the north-east shore which very likely was drifted across with the ice, though it is possible some of it may have come down the Martin River from the mountains on the head of that stream.

Count de Sainville informed me he found three seams of lignite on the shores of Hutchinson's Bay on the Arctic coast. Two of them were about four inches in thickness, and the other he could not measure. As he saw them in different places it is possible there may be only one.

BITUMEN.

In my report of 1889 I referred to the existence of bituminous (or, as they are known in the country, tar) springs on the shore of the east end of Lesser Slave Lake. I had never seen them, but in 1884 heard from the Hudson's Bay Company officers at Lesser Slave Post of the existence of such, and that an old Indian had exhibited specimens of the tar at that post and also taken samples to Edmonton. Under the impression that he had something very valuable, he would not disclose its, location further than to say that it was near Martin River.

Mr. R. G. McConnell, since then, in a geological examination of that part of the country, searched for but failed to find any trace of that substance in the locality; this cast some doubt on my information, but still the fact remained that the tar had been seen. On my way down last winter this old Indian came to see me at the East end post. I found him much readier to give information concerning those tar springs than he was, as he had learned that it possesses no value to him at least. He said the tar oozed out of the sand near the water's edge at many different places about midway between Martin River and the head of Lesser Slave River. He said it could very seldom be found twice in the same place, as the waves washed sand and gravel over it. From this it would appear that there is an area here in which it exists, similar to some of the places on the lower Athabasca, which after high water in the river show no indications of its presence until after a bright hot day, when it oozes through the deposit on top of the sand which contains it. He seemed offended when I intimated that its existence was doubtful, and affirmed warmly that if the snow were not on the ground he would take me and show so that I would see for myself. I may mention here that he came to see me for the purpose of showing me some mica which he found south of the lake. It took some time to persuade him that the specimens he had were worthless, nor would he, until he had been mollified by a good supper, answer any questions as to its locality. As I had no reason to suspect the existence of mica-bearing rocks in this region I questioned him as to the place and extent of the rock he found it in. He seemed to suspect from my eagerness for this knowledge that it must be of some value, and gave me evasive answers for a long time. At length I learned he got it out of some large boulder not far from the lake, near the mouth of a small river entering on the south side only a short distance from the island.

In my report of 1889 I referred to the existence of a natural gas well on the Athabasca River below Grand Rapids, then I could only speak of it from hearsay, but on my way down last summer I sought for and found it. It is situated about seventeen miles below Grand Rapids on the left side of the river opposite to a high sandstone cliff from the top of which the timber is all burned off. There is quite an extent of the river here in which the gas bubbles up, and on the beach close to the water's edge there are one or two rifts in the clay bank through which it escapes. I fired it and it burned with considerable flame for quite a time and I left it burning.

Gold.

Gold is found in small quantities on Peace River and at present there are several miners on that stream. One of them (Mr. Burbank) holds a theory that the gold in the river is held in the so-called black sandy shale which is close to the water's edge in the vicinity of St. John. He tried this and found small quantities of this metal in it; hence he infers that it is the erosion of those banks by the river that renews the gold on the bars. In this case it might be said that hydraulic mining would pay, but as this shale is overlaid with an immense thickness of sandstone such operation would soon be stopped.

The clay ironstone which I have already mentioned in connection with the rocks on the East Branch and Sicanni Chief Rivers need hardly be classed as an economic mineral, its quantity irrespective of its quality is so small.

Mr. McKinlay in his journeys north of Great Slave Lake saw only a few small specimens of mica. It would appear from his description that the rocks are all Laurentian.

As the general distribution of petroliferous rocks in the Athabasca, Peace and Mackenzie valleys is pretty well understood, it is needless to refer to it. The reports

of Dr. Bell and R. G. McConnell, of the Geological Survey, give a pretty thorough general as well as technical description of them; also my own report of 1889 gives some information on that subject.

No other minerals were seen or heard of that possess any interest economically.

AGRICULTURAL RESOURCES OF THE DISTRICT.

In my report for 1889 I dwelt at some length on the agricultural capabilities of the Athabasca, Peace and Mackenzie River districts, I will therefore now confine myself principally to what I observed on the Liard, East Branch and upper Peace Rivers, referring only to the other parts of my journey casually.

I premise by stating that the season of 1891 was unusually dry, consequently the gardens on the Athabasca, Great Slave and Mackenzie did not present a favourable appearance as I have seen them do on former visits.

Fort Providence was infested with grasshoppers to such an extent that every bit of grain sown there was cut to the ground, nothing but the stubs of the stalks being visible. Wheat has been grown here with varying success for many years, and the fact that in latitude $61^{\circ} 20' 38''$ it has been completely devoured by grasshoppers is itself worthy of record.

At Simpson the garden stuff and grain although very nice in appearance was not up to what I saw there in 1888, just at the same time of the year too; though it would compare very favourably with the appearance of those in places ten and fifteen degrees farther south. At that date (August 25th to 28th) garden stuff was well advanced; green peas were in use, as was cabbage, potatoes, carrots and other vegetables, all large and well flavoured. The barley sown was short and stunted-looking from drought, but of fair quality. In 1888 the company's officer in charge planted ash-leaved maples sent in from Manitoba to see how they would stand the climate, eleven degrees farther north than their native home. Last year they were quite large and seemed to flourish as well as they would have done on their native ground. Many head of cattle are kept here which seem to thrive as well as they would anywhere else in our country. The hay for their winter subsistence is cut on the hills south of the fort.

At Fort Liard the same drought seems to have prevailed and prevented the usual development of what was planted. At the date (September 4th) of my arrival the barley had been harvested some days, and though the straw was short the grain was plump and hard and of fair yield. Potatoes were of good size and fair quality. Wheat has often been grown here successfully, but as it can only be used whole it is considered better to grow barley which can be and is much used as cattle food. Cattle are kept here and seem to thrive as well as at other places in the country. At this post the soil is a rich black loamy clay and the surface is thickly wooded all around. As seen from the high ground on the opposite side of the river, the country to the south and east appears undulating, rising into extensive ridges all heavily timbered. This condition is said to continue through to Hay River. In the valleys are many lakes, some of considerable extent, and many extensive swamps. I could not learn anything of the character of the soil, but it is fair to assume from the general character of the woods that it is of fair quality. While at this fort I examined the daily journal of events kept at every post, for the purpose of getting some information as to the times of the general run of farming events, opening and closing of the river, or any other fact of agricultural, meteorological or general interest. I will here make a few explanatory remarks with regard to these journals. It is a standing rule in the company's service that a journal of daily events be kept at every post, but each officer seems to have a different idea of what a daily event is, and there seems to be a want of continuity, so to speak, in the records when there is a change of writers or officers; some officers aiming at making it what it was intended or ought to be, a chronicle which could at any time hereafter be consulted with confidence regarding historical, meteorological and agricultural events in particular, and information generally. Unfortunately many seem to have considered it an unpleasant duty, and put it off from day to day, until a long interval had elapsed,

then went at it in desperation and made the best record they could from memory, of course often omitting many items of interest and general importance. In many of the journals I have seen, there are great gaps, the officer at the place being absent on a journey, or sick, or otherwise unable to write the journal at the post.

Each recorder stamped his character in his entries as plainly as if it were a part of himself, which after all it really is. Some appeared to have enjoyed a quiet sit-down with a pipe and pen and had a pleasant confidential chat with a friend, narrating their own doings, and hopes and fears in connection with them. Others seemed to have considered it an audience to whom they grandiloquently communicated their estimate of their own powers and ability. Others have been moralists reflecting with a sad smile and a shake of the head on the shortcomings of those around them. Many have been witty, entering with much detail any ludicrous event that may have occurred and embellishing it with amusing reflections and remarks. It is unfortunate that some common motive did not actuate every recorder, as it has made valuable references in some cases of little use.

The journals at Liard gave me the following dates and facts:—

1878. Planted seed May 9th; reaped barley, omitted; first ice drifting in river October 18th; ice set in river October 29th.

1879. Planted seed April 22nd; reaped barley August 14th; first ice in river October 15th; ice set fast November 7th.

1880. Planted seed May 7th; reaped barley August 14th; first ice in river October 25th; ice set fast November 9th.

1881. Planted seed May 5th; reaped barley August 12th; first ice in river October 10th; ice set fast November 13th.

1882. Planted seed May 9th; reaped barley August 22nd; first ice in river October 16th; ice set fast November 7th.

1883. Planted seed May 3rd; reaped barley August 10th; first ice in river October 29th; ice set fast November 9th.

1884. Planted seed May 1st; reaped barley, omitted; first ice in river October 10th; ice set fast October 29th.

1885. Planted seed May 22nd; reaped barley August 11th; first ice in river October 23rd; ice set fast omitted.

1886. Planted seed May 7th; reaped barley August 19th; first ice set in river November 9th; ice set fast November 20th.

1887. Planted seed May 3rd; reaped barley, omitted; first ice in river October 22nd; ice set fast November 9th.

1888. Planted seed May 9th; reaped barley, omitted: first ice in river October 20th; ice set fast November 5th.

1889. Planted seed April 16th; reaped barley, omitted; first ice in river October 28th; ice set fast November 14th.

1890. Planted seed April 30th; reaped barley, omitted; first ice in river October 15th; ice set fast November 14th.

Potatoes are generally harvested about the 20th September. The ice generally breaks up in the river about the 1st of May.

Fort Nelson has only been in existence twenty-six or twenty-seven years. A small clearing has been made around the post, and a few potatoes generally planted. Last year every thing planted was destroyed by the floods already described. Barley has been tried there several times with success. Owing to the smallness of the clearing here, and the height and density of the surrounding woods, I would not call the conditions here favourable to a fair test of the capabilities of the district. All the journals of the post previous to 1887 were at Fort Simpson, a fact I was not aware of when there or I would have searched for and examined them while there.

I gleaned the following entries from the journals at Nelson:—

1887. First drift ice in river, omitted; river frozen over October 23rd.

1888.—Ice started out of river May 7th, first drift ice in fall October 19th, river set fast October 31st.

1889.—Ice started April 10th, first drift ice in river October 30th, ice set fast November 10th.

1890.—Ice started down river April 30th, planted potatoes May 17th, took up potatoes September 18th, first drift ice October 23rd, ice set fast November 4th.

1891.—Ice started out of river April 22nd, planted potatoes May 18th.

On the west side of the Liard and East Branch Rivers it is not very far to the mountains, consequently the area of land which might be utilized agriculturally is not very extensive on that side. On the east side the same character of surface holds I believe from the Liard southward to the Peace watershed, high dry ridges with intervening swamps and lakes; many of the swamps very extensive. This is as the Indians and one or two white men who have made journeys in it have said of it. The soil is generally of fair quality, some of it good. On my way from Sicanniie Chief River to Peace River I found the same general characteristics, ridges with swamps between. I am afraid the elevation above sea level along this route (the average reading of the barometer being about 2700 inches while I was on it) is too high to allow farming in the sense we understand it. On the streams flowing in to the Peace there is much prairie, but it is confined mainly to the immediate valleys of the streams; much of it is springy and wet, evidently the water from the adjacent swamps percolating through. The soil is all good and if the climatic conditions were suitable a very large percentage of good country would be found in this section. Many of the swamps could easily be drained as the natural drainage facilities are good. Although it was in October I passed over it, I witnessed no severe frosts, very little ice being visible any where, and the flora gave no evidence of having been much injured by frost. In the prairies along the creeks the grasses and plants were of as luxuriant growth as in places much farther south and east. The grass was generally long and meadow-like, but as we approached Peace River it became more like the true prairie grass until extensive areas of true prairie were passed over along the tributaries of the Peace River. For a distance of six or seven miles back from the Peace River valley there is much prairie and meadow land, with some woods and swamps scattered over it. The soil is an excellent black clay loam as rich as any I ever saw, and the growth of hay and grass bears testimony to this fact. The dip of the valley from this plain is very sharp and the bank very steep falling about 800 feet in a mile.

At Fort St. John the Hudson's Bay Company have a small patch on which they raise potatoes and garden stuff together with barley and oats. The grain always ripens and the vegetables are as good as one would wish to use. Mr. Gunn, the officer in charge here, has been in the Peace River district since 1883, and during the interval since then has wandered around the adjacent country a good deal.

There is an old pack trail on the north side of the river between St. John and Dunvegan. This trail is far enough back from the river to avoid the numerous ravines which run into the Peace valley. I understand that the general character of the country along this trail is much similar to what I came over on my way to St. John. Some prairie on the streams and wooded ridges and swamps until we come within seven or eight miles of Dunvegan where it becomes drier and more prairie-like.

Mr. Gunn informed me the country south of St. John was all densely wooded as far as he had seen or heard. On the south side of the river a trail also exists between St. John and Dunvegan. On this trail for a distance of about twenty-two miles from St. John the country is much wooded, when it changes to open woods and prairie for a distance of about thirty miles, when it again becomes wooded for about twenty miles which is succeeded by prairie and poplar bluffs to within six miles of Dunvegan. It appears the soil is everywhere good along the track, and as it lies about twenty miles south of the river the greater portion of the distance it is fair to assume that it is pretty much the same in the interval.

The Hudson's Bay Company have several bands of horses in the vicinity of St. John, only a few of which have ever been broken. These animals live on the prairie on the north side of the river winter and summer and very seldom are there any losses, except by wolves or when the Indians are starving they may quietly dispose of one or two and report them lost. Many of the Indians in the vicinity now have horses of their own. In summer they take them with them on their hunting

excursions using them to pack their property from place to place; in the winter they leave them in the vicinity of the Fort. The fact that horses can safely winter out here speaks well for the future of the country. St. John is visited frequently during the winter months by the so-called Chinook winds, which often sweep away the snow completely. The prevailing direction of those winds here, as elsewhere, is from the south-west.

The farming operations here have always been confined to the immediate vicinity of the river in the valley, and so are not a test of the capability of the uplands.

Here I examined many of the journals and gleaned from them the following dates and facts. My search began with the year 1866, but to transcribe here every year since then would serve no useful purpose, I will, therefore, give a few years subsequent to that date and a few previous to 1891.

1866. First ice drifting in the river 1st November, but the weather continued fine and open and it was 2nd December before it was frozen over. There is a gap in the record of this year from 17th March to 1st June, and from 2nd June to 1st November, but it is incidentally mentioned that the potato crop was not good.

1867. Is so fragmentary that I could find nothing of note, except that the river was frozen over on 3rd December.

1868. The record for this year begins 16th June, first snow on the plains above 26th September, harvested potatoes 5th October, harvested turnips 17th October, first ice drifting in river 7th November, river frozen over 17th November, 14th December, mild again and ice breaking up.

1869. Snow began to disappear from the hills in sheltered places March 11th; started ploughing April 14th; ice began to break up April 22nd; planted potatoes April 26th, 27th and 28th; ice all moving in river April 27th; no more entries till September 13th; harvested turnips September 17th; harvested potatoes September 20th; ice drifting in river November 8th; appears to have frozen over about the middle of December, but no date is given.

1870. The records for this year are not legible, and much broken; all that I could make out was that the farm work began on April 27th, and the ice was still running on May 2nd.

1871. Ice began to open April 18th; planted potatoes and barley April 27th; planted carrots, parsnips and onions April 29th; river clear of ice at last date; it is blank between May 4th and November 10th, when it is stated there was ice drifting in the river; river frozen over November 15th. The fur returns for 1871-72, from November 1st to February 28th, are entered in the journal as follows: Beaver, 1,079; bears, 55; fisher, 7; lynx, 15; minks, 2; martens, 195; otter, 8; wolves, 8; wolverines, 17; but it is reasonable to suppose that the spring trade would add very largely to those quantities.

I will now skip to 1887. Ice commenced to break up April 26th; commenced to plant potatoes April 28th; river clear of ice May 5th; first ice drifting in river October 23rd; but mild weather set in and it remained open until November 11th, when it began to drift again; did not set until December 3rd.

1888. Ice started to move May 1st; commenced to plant potatoes May 9th; first fall of snow October 21st; ice commenced to run in river November 5th; ice set November 16th.

1889. Ice commenced to break up March 30th, but did not make a general start until April 9th; commenced planting potatoes April 24th; first ice in river omitted; ice set fast November 24th.

1890. Ice commenced to break up April 30th; planted potatoes May 9th; first drift ice in the river November 29th; ice set fast December 21st.

1891. Ice breaking up April 17th; commenced planting potatoes May 1st; first snow at post October 23rd; first ice in river October 28th; ice set at Smoky River crossing November 17th.

On my way to St. John across the plateau snow fell on two different days, October 10th and 15th, but it was only a very slight fall both times, and disappeared as soon as the sun rose.

This post was first established at the mouth of Pine River, about twenty-five miles farther down the Peace, but about sixty years ago the officer in charge was shot by the Indians, and it was moved away in consequence. I have heard that the fight or murders at Dead Man's Island, Great Slave Lake, originated in the death of this officer, his slayers fleeing from the country for safety; but some of the half-breed servants of the slain officer followed them up, came up with them at the lake and quietly killed them while asleep. This may or may not be true; no one could vouch for it as being so, and I give it merely as I got it. The remains of the officer were taken to Dunvegan for interment. A grave board, if I may use the expression, stands now at his grave, on which is painted an account of his death; but when I was there in 1883 and 1884, it was not decipherable, being very much weathered, and naturally it was still less so last year. The old journals, containing accounts of this and other events, have been removed or lost.

At Dunvegan the company has grown wheat, barley, oats, potatoes and garden stuff generally for many years with astonishing success. When I was there in 1883-84, I saw grain and vegetables fully equal in quality and quantity to any I have even seen anywhere, the garden vegetables being especially fine. Last year everything was harvested and stored when I got there, but what I saw of the produce was excellent. I saw two sunflowers which measured fourteen inches across the disc. With the corolla attached, those flowers must have been nearly two feet in diameter. The seeds of each weighed fourteen ounces and measured nearly a quart. A head of cabbage was shown from which I stripped off all loose leaves, leaving it fit for cooking, and then measured and weighed it. It measured $53\frac{1}{2}$ inches in circumference, and weighed $28\frac{1}{2}$ pounds. This was an exceptionally large head, of course, but the general run of both cabbage and cauliflower was large and would be considered so anywhere. Mr. Round, the officer in charge of the post, told me he two years ago made a departure from the old fashioned method of growing those plants, and instead of developing them in hot beds he simply planted the seed once for all in drills in the garden, and when they arrived at the proper stage, pulled out the superfluous ones. He found this method just as satisfactory, and much less troublesome. The other garden vegetables were just as large and good as one would wish to see them. There was an unwonted drought there last summer which interfered with the usual development of everything, but the quality of grain was good. Mr. Round informed me he planted fifteen bushels of potatoes last summer, and after using them freely for the sustenance of his family (five members) and the servants, in all, eight or ten, from the time they were fit for use until they were harvested, he harvested upwards of two hundred bushels. He sowed about four bushels of wheat, and though the dry season much affected the result, he will have about sixty bushels. This grain is used in various ways, some of it being ground into flour by the aid of small hand mills. He sowed four bushels of oats, and although part of the crop was destroyed by a hail storm, one hundred bushels were threshed. In 1890 he planted twenty-five bushels of potatoes, and though they were freely used from the time they were fit until harvested, 712 bushels were harvested. The Anglican and Roman Catholic missions here also successfully raise both grain and vegetables, the latter depending much for their subsistence on the results of their agricultural labours.

This post has been in existence for the greater part of a century, and more or less farming has always been done at it since then.

With Mr. Round's kind permission I perused some of the old journals. Though I did not get the earliest, I will insert a few extracts from them by way of comparison with recent journals.

1828. First ice drifting in river 6th November, ice set fast 29th November.

1829. Ice began to move in the river 12th April, sowed barley 17th April, planted potatoes 30th April, cut barley 10th August, cut wheat 25th August, harvested potatoes 24th September, first snow 21st October, first drift ice 24th October

1830. Ice broke up 28th April, sowed thirty quarts of wheat 3rd May, sowed garden seeds 4th May, planted potatoes 5th May, cut wheat 14th September, com

menced digging potatoes 27th September, first drift ice 29th October, ice set fast 25th November.

There is a break in the succession here and I will begin again with 1886. Ice started to break up 13th April, sowed barley 12th May, planted turnips 13th May, planted potatoes 17th May, began harvesting operations 20th August, cut buckwheat 2nd September, harvested potatoes 23rd September, stored 984 bushels, slight snow 12th October, first ice drifting 10th November, ice set fast 30th November.

1887. Ice started 27th April, sowed oats 29th April, sowing other seed 2nd May, commenced planting potatoes 5th May, sowed garden seeds 9th May, sowed pease 11th May, finished planting potatoes 28th May, planted fifty bushels, severe frost 7th June, injuring young vegetables, etc., severe frost again 25th June, cutting down everything to the ground, potatoes and all, 29th July new potatoes for the first time, first snow fell 16th September, commenced taking up potatoes 20th September, harvested 618 bushels, took up turnips and carrots 5th October, first drift ice in river 24th October, but it cleared out again and returned 12th November, set fast 29th November.

1888. Ice moved 1st May, began sowing barley 9th May, began planting potatoes 10th May, sowed oats and wheat 15th May, sowed garden seeds 16th May, sowed turnips 28th May, slight frost 1st August, injured garden stuff, cut barley 5th September, cut oats 7th September, started taking up potatoes 27th September, finished 3rd October, 529 bushels stored, took up turnips 5th October, first snow 16th October, first ice in river 27th October, ice set fast 27th November.

I would now call particular attention to the mention of frost in June, 1887, and the fact that it cut down vegetables to the ground; alone there is nothing very wonderful about the statement, as it is just what we would expect frost to do, but in conjunction with using new potatoes for the first time on the 29th July, just one month after the frost, and the further fact that 618 bushels were harvested it is most astonishing. Mr. Round, the officer who made the entry, was a witness of the event, and he is a gentleman whose sanity I would as soon doubt as his word. I questioned him about it and he assured me emphatically of its correctness. He can offer no explanation, if it is not that a fog generally settles in the river valley after a frost and shields plants from the direct rays of the sun a good part of the day, but even this does not account for this case, as he assured me the potatoes were cut down black to the ground.

The Rev. J. G. Brick, Anglican missionary, who spent some years at Dunvegan, combining farming with mission work, in 1886 started what might be called a branch farm at Old Wives Lake, about thirty-six miles from Dunvegan, on the cart trail, between the latter place and Smoky River crossing, on the plateau above the immediate valley of the river. Reference will be made to this later.

In 1889 he established himself in the valley of the river on the north side, about five miles above the mouth of Smoky River. Here he has established a mission and a school for the education of the young, on which he bases all his hopes for the improvement of the natives. He keeps this school open during the winter months, and as an inducement to attend, he gives all the children who live at a distance their dinner.

This gentleman took in with him a large outfit of farm implements and stock. He has a small grist mill and threshing mill, with which he threshes and grinds his grain. By grinding his wheat twice it makes a fair article of flour, but his facilities for bolting it are not quite up to the times, consequently his flour is not quite as white as our high grade flour, but makes good bread nevertheless.

He is well satisfied with his success agriculturally. He furnished me with the following information relative to his doings in 1891: Began ploughing 11th April, sowed first wheat 15th April, ice broke up 20th April, river clear 26th April, commenced harvesting 20th August, cut wheat 27th August. About 19 acres under grain, total yield 698 bushels; wheat, 250 bushels on 6 acres; oats, 200 bushels; barley, 226 bushels. After all the grain was removed he raked his field and got 22 bushels of grain from the rakings. He sowed two varieties of wheat, Ladoga and

wheat he got in Manitoba, which he thinks is Red Fife, but is not sure; both are beautiful specimens of grain. He has some two-rowed barley which he procured while in England in 1888, when he obtained one pound; yield in 1891 was 600 pounds of as fine clean, bright, plump grain as could be seen anywhere.

His ucadoga wheat was sown 21st April and harvested 24th August, but he allowed it to over-ripen, and thinks he lost at least four or five bushels while harvesting. He sowed 90 pounds and threshed 1,500. He obtained a sample of black Norway oats from Webb & Co., England, which he sowed on five-eighths of an acre of ground last year; when harvesting it was all drawn off the field in one wagon load, and when threshed it turned out 64 bushels of first-class grain. Last year he tried Indian corn, it did not ripen, but yielded excellent green corn; cucumbers were grown successfully, but did not ripen. Yet I saw as good pumpkins fully developed both here and at Dunvegan, as one would wish for.

Mr. Brick has for some time kept a meteorological record in connection with the Meteorological Service at Toronto and he furnished me the following results:

Rainfall in inches in the month of April, 0.21, May 1.59, June 1.80, July 2.91, August 0.12, September 0.50, October 0.24, first snow 24th October.

Mr. Brick has about forty head of cattle and several horses, last fall on, my arrival there he had about forty pigs, but killed some during my stay and only intended to winter about twenty-five. He employs a good deal of local labour and pays for it with food to a very large extent, in fact it is the only way it could be paid for in the country. The hay for wintering the cattle and horses is cut on the plateau about seven miles from the farm. He generally allows his cattle to run out until about Christmas, the grass on the meadows being high enough for them to feed on it after the early snows have fallen. The horses not kept in for use are wintered out. The Hudson's Bay Company at Dunvegan have about 150 wild horses and the Roman Catholic Mission and Indians also have many which always winter out on the plains north of the post, which affords them both food and shelter, as the country between Dunvegan and Smoky River crossing on the north side is park-like prairie to a distance of twelve to twenty miles back from the river. The woods afford them shelter, and on the prairies the richest grasses grow. There are also large areas where excellent hay grows. No other attention is, or has been, given to those animals than to occasionally send a man out to hunt them up and count them. This is not as difficult a task as it might seem, as they run in bands; each band consists of mares and a stallion, who will fight to the death for the possession of his mares. Each band is known by the name of its stallion and as each keeps pretty well in a certain tract, it is not so difficult to keep track of them as it would appear. I saw several bands on my way from Dunvegan and all were very fat, notwithstanding that the cold weather had set in a month before, and the snow had been a foot deep for eight or ten days. Chinook winds occasionally visit this part of the country and carry the snow off. Here also they blow from the south-west. The approach of one is known some little time before it arrives by the roar it makes. Many people in the country call them the "high winds," they blow so strongly. They often visit Lesser Slave Lake.

I have not seen the lower parts of Peace River since 1884, but I was informed that Messrs. Lawrence, one of whom has been in the country many years, the other since 1887, at a great expense of time, labour and money, had managed to get in a portable Waterous steam engine, threshing machine and grist mill. At that time the machinery had to be drawn on wagons from Calgary to Athabasca Landing, three hundred miles in round numbers, taken from there to Lesser Slave Lake in York-boats, thence over a rather rough road about eighty miles to Peace River and down it about two hundred and fifty miles to Vermilion.

They are reported to have large herds of stock and horses, one of them it was said had 140 pigs last fall. It is said they raise large quantities of barley and oats. As I have not seen any one from the vicinity lately, I can only say that those gentlemen are said by every one who has heard from them to be well satisfied with their venture. They were formerly residents and I believe farmers in the Eastern Townships in the Province of Quebec, and if the truth is told concerning them they would

rather farm where they are than there. In 1884 one of them personally assured me of this and it appears he has not changed his opinion.

In 1882 three parties went into the Peace to settle in the neighbourhood of Dunvegan, but only one of them remained. He settled at a place called the Water-hole about eleven miles from Dunvegan, and made a feeble attempt at farming, but with no more success than his efforts merited. After his departure in 1884 the Hudson's Bay Company cultivated his claim, but with very indifferent success. In the journal for 1886 it is stated that the grain at the Waterhole was sowed and reaped about the same time as at the post, but it is not said of what quality it was; it is fair to assume, however, that it was fair; otherwise it would very likely have been stated so. In 1887 it is stated that the Waterhole crop was destroyed by the frost. As far as I could learn the success there was limited.

Mr. Brick farmed at Old Wives Lake from 1884 to 1889, and he informed me he had only two good crops and one indifferent. One of those two he described as excellent, the other good. The remainder were total loss. Disheartened with his failure he abandoned it altogether.

In the summer of 1883 while I was engaged surveying on the plateau in the vicinity of Dunvegan we had frost three or four times in August severe enough to destroy any grain at the stage of development it would be in at that date, and worse still there were severe frosts in July. It appears from this that though farming in the immediate valley of the river has always met with a large share of success, on the plateau the experience is far from satisfactory, that is what little there is of it, and as both places tried were selected for their favourable location it is fair to assume that it is a fair test of the capability of the plateau. The difference in altitude between the river bottom and the plateau being about 1,000 feet generally, this alone would account for the different results of a frost. In addition to this the presence of a large body of water in the valley at a temperature of 55° must have a beneficial effect, also the condensation of the moisture in the valley emits heat during the evening, so that a frost cannot have the same effect there as on the plateau. To conclude on this subject, I would not advise any one seeking a home in our great North-west to think of Peace River. There is only a limited area in the valley which is the only place success can be reasonably expected, and even there success is only an assurance of a living, as there is no market at present. The Hudson's Bay Company takes into the district three or four hundred sacks of flour, and it is probable this amount will be required for some years to come if the amount does not annually increase, which is probable. Besides this, as much or more is required around Lake Athabasca, and as much more at least on the Mackenzie, in all say 2,000 sacks; but to make even this market available a fair grist mill would have to be taken into the country, and this would, under the circumstances, be a tremendous undertaking. The way to this market would be down the Peace River, which from Hudson's Hope at the Rocky Mountain portage to the falls below Vermilion is easily navigable for stern-wheel steamers drawing three feet of water with the exception of one small bar in very low water. At the falls there is a little over a mile of the river obstructed, and from there to Fort Chipewyan as has already been stated is clear, thence, as has been already described, to Fort Smith and the Mackenzie River. I regret that I have to present such an unfavourable account of a region of which much has been said and written. That the soil is excellent and much of it available for immediate use cannot be denied, but the occurrence of severe frosts on the plateau when the grain is not far enough advanced to resist its effects may be as far as our experience goes considered a certainty in the majority of seasons. It may be that when the necessities of settlement require it, early seeding and early varieties of grain may materially alter conditions, but at present I would advise no one to think of farming there except in the river bottom, in which there are flats extensive enough to locate a few score homes.

Were it not for the difficulty of getting into and out of the country stock raising might be profitably engaged in. Hay is abundant and of good quality nearly everywhere, and in summer the grazing is excellent. Notwithstanding the latitude

and altitude, cattle, as I have already mentioned, subsist with moderate help from the first of May till the middle or end of December; the rest of the year they have to be sheltered and fed. The Hudson's Bay Company has a ranch on Spirit River, south of the Peace about twenty miles, and on the trail between Dunvegan and Grand Prairie. This was started a few years ago, and some fine stock was put on it. What the result of the experiment may be remains to be seen. Cattle have been kept at all the posts for many years, oxen being largely used in freighting.

At Lesser Slave Lake the company and missionaries and most of the natives have cleared small pieces of ground, on which they grow potatoes and garden stuff for their use. Most of the natives attached to this post subsist by fishing, eking out by such vegetables as they may be able to grow. They are nearly all employed during the summer by the company in boating and transporting the trading outfits for the posts in the district and on Peace River. The hire for this labour keeps them in clothing, ammunition and other necessities. Many of them subsist in this way altogether, but most of them hunt during the winter months. In connection with this post the company keeps many horses and oxen for transport between the lake and Peace River. These cattle and horses are nearly all wintered at what is known as the cattle sheds, about fifty miles distant from the post on the Peace River trail. At this point there is an extensive prairie, a part of which the company uses as a meadow on which they cut hay; stables and sheds have been erected and winter quarters for the caretakers. I am not aware that anything has ever been tried in the agricultural line.

Since the establishment of a permanent post at Athabasca Landing, potatoes and vegetables of good quality have been raised there. I do not think any attempt to raise grain was ever made here. There is much prairie along the trail between here and Edmonton, and much of it will likely be taken up in the coming season.

FUR.

The fur-bearing animals found in this vast northern district may truly be said to be the only source of revenue it has at present. The business of all the whites in it except the missionaries, and they are not altogether exempt, is fur trading. The Hudson's Bay Company is universally known as "the company," and others engaged in trading are termed traders.

At every post south of Resolution there are traders, but at times they have been north of this, penetrating as far at one time as Good Hope on the Mackenzie. I confess I cannot see what induces any one to risk his time and capital in such a precarious trade as this has often proved to be. Many have year after year embarked their all in the purchase of an outfit, and toiled and slaved for weeks under heavy expense to get to some spot where fur was plentiful, generally to find that their portion of it was small, as the company hotly opposes all traders in their search for pelts.

It often occurred to me that one-half the energy and watchfulness displayed by those opponents in their chase after a few pelts, if exercised in the civilized parts of the country would produce much more satisfactory results. Men and dogs are kept in constant readiness to start on journeys, and every one is constantly on the alert for news of Indians and whether or not they have any furs. If they have any, away goes a man and dog train in hot haste to secure them, which, when accomplished is considered a victory. The result of nearly all such contests as far as I have seen or heard is that sooner or later the company either drives out or buys out its opponents; when I use the term "drives out" I mean in a business way, through competition. The consequence of all this eagerness is, the price of furs has gone up tremendously within the last few years; it is not uncommon for as much to be paid for a pelt as it would bring when brought to market. This benefits no one, the traders make nothing out of their business, and the Indian does not seem to profit much by the increase, for he has the happy knack of spending all his income, and increasing his debts at the same time; the more he has to spend the more he wants

to spend. Most of them are inveterate gamblers and will sit for days gambling anything and everything belonging to them. Sometimes some of the traders try their hand at this with them, but as a rule not often; the result of such trials generally is that the Indian is a sadder but not a wiser man.

A very deplorable result of such competition is the demoralization of the Indian, he seems to consider that fur is worth anything and everything he can get for it. He also seems to think that he has been defrauded in the past (I am not sure that he is not often taught so) and that he is quite justified in repudiating his debts. Traders as a rule are not over anxious to give the native "debt," as it is termed in the country, that is credit; and commercial integrity is at such a low ebb that the company dare not, at least not to such an extent as they formerly did, and often this causes hardship. Very seldom though, does the company refuse aid to any Indian deserving of it.

Some of the Indians in the country are beginning to realize that outside markets pay more for furs than the local ones, and in one instance at least took advantage of it. Last summer many of the Chipewyan Indians joined together, constructed a scow, employed a guide, and started up the Athabasca River with their wives, families, and season's catch of fur, intending to make their way to Edmonton. This they succeeded in doing and sold their furs to such advantage that they will likely repeat the experiment and induce others to do so unless they are paid as much in the local market as they got at Edmonton. They do not consider their time worth anything in such a case as that, nor is it, as they might as well be travelling to Edmonton or elsewhere as loafing around a post begging or gambling, and because they consider their time worth nothing in such cases, it is very difficult to get them to think of the cost in connection with getting goods into the country, and they see nothing inconsistent in asking as much for their pelts at Chipewyan as they could get at Edmonton.

I can offer no statistics of this trade, as any information I might get at the posts I visited would only be fragmentary at the best. I can say, however, that all traders and Indians agree in one respect, that is, that fur-bearing animals, especially beaver, the once staple fur of the country, is getting scarcer every year. One Indian, at Fort St. John, illustrated this to me by interlacing the fingers of his hands, and remarked that the Indians from opposite districts were now meeting in their winter hunts, and that beavers were so scarce that they had to hurry all they could to get to their hunting grounds before the others, or they would find nothing. Though other animals hold their ground somewhat better, all are decreasing, and will do so in a greater ratio as time goes on. The native seems to have no idea of protecting fur-bearing animals but slaughters all that come in his way, regardless of age or quality. It is almost too late now to interfere to preserve this resource of the country. The North-west Council has ordinances in force protecting game and fur-bearing animals, but they are not in force beyond the legislative districts. It would be unreasonable to expect the Indians to observe laws preventing them from killing animals when they require them, but some restriction could be placed on the indiscriminate slaughter by preventing the exportation of pelts unduly small or of poor quality, that is those killed out of season. This might be accomplished by having every pelt inspected before it left the country, and punishing the purchaser or possessor of too small, or too poor ones, or by leasing the country in districts to responsible parties and binding them to pay a reasonable amount of attention to the preservation of fur-bearing animals and game. The first scheme would hardly be practicable, as the native is hardly responsible for the size of the animals he kills, except in so far as he kills them with his gun. His traps and snares are just as apt to catch a young animal as an old one, and they are often dead when he gets them. As long as such excessive and senseless competition as there is exists, so long will the native kill all he can when he can, as he is sure to find a buyer for anything he may have, and rather than allow their opponents the prestige of getting a few skins, traders will buy anything.

The second scheme is contrary to the spirit of the time, but even a monopoly is justifiable for a good purpose. It might be asked, how would placing the districts

in the names of individuals or companies, and preventing competition protect the fur in that district? As remarked before, this measure no more than the other would prevent small animals being trapped, but it would be in the power of the lessee to prevent trapping and killing fur-bearing animals; most of which are unfit for food out of season, when neither flesh nor fur is fit for anything, by refusing to buy such skins and punishing the native who did so by refusal of credit, or in many other indirect ways. Once he understood that such slaughter was useless and hurtful to himself he would be watchful not to commit himself. This, though not a positive protection, would I think prove very beneficial. If something is not done and soon there will be little or nothing to protect. Game such as deer, moose, buffalo, the musk ox and very often bear are always shot: hence the hunter knows just what he intends to kill, and could be educated to avoid killing, unless in cases of necessity, females bearing young, or very young animals, particularly is this so in the case of musk ox, which the Indian can kill almost as readily as we could kill barn-yard cattle. The buffalo in the country is known as the "wood buffalo." It is the last remnant of the vast herds which once roamed in countless numbers over this country, and whilst very strict laws and heavy penalties protect this animal where none have been seen for years, no attempt is being made for the preservation of the few that do exist in the north. The haunt of the wood buffalo lies north and west of the Athabasca River, across the Peace to the Liard River, and at Fort Liard it was reported that two of them had crossed the Liard and had been seen in the mountains to the north-west of the Fort. Compared with the area of the district they inhabit their numbers are very small, probably not exceeding three hundred in all. This is in striking contrast with their numbers as reported half a century ago, when it was no uncommon thing for a few Indians, in the neighbourhood of Dunvegan and St. John, on Peace River, to go out and in a few days procure sufficient meat to supply their wants a good part of the winter. As no undue slaughter was practised here by the natives or traders, it might be asked what has caused the rapid decrease in their numbers? The explanation given is that a heavy fall of rain occurred in one of the winter months, about 25 years ago, which completely saturated the snow, which was then frozen, and converted into an immense cake of ice, and the buffalo and all animals that graze and do not browse were nearly exterminated. This explanation might suffice for a portion of the district, but a rain storm could hardly be general enough to account for the desolation of the whole district. Be the cause what it may, there are only a few scattered bands which the Indians occasionally run across in the forest and hunt, being only too well satisfied if they can kill the whole band. This, however, is difficult of accomplishment, as they can only be hunted on foot and are said to be very alert, sighting and scenting the hunter before he knows of their presence, stampeding on the least alarm, and never resting until they are well out of danger. Their flight through the snow is said, by eye witnesses, to resemble a prairie blizzard, as nothing is to be seen but a whirl of snow with an occasional glimpse of a black speck in it. On account of their watchfulness the Indian is hardly ever successful in killing all of a band, but sometimes the brutes run into a bog and get mired, and before they can get across a large proportion of their number are killed.

To impose a law regulating the killing of these animals by the Indians would be absurd, as they could not be expected to, nor would they, comply with its provisions. They would kill them whenever they could, more especially if they wanted food. Fortunately they do not run across them often, and only occasionally a few are killed.

The scarcity of the animal and difficulty of getting near it does not deter white men from going into the region to try and secure a few, for no other reason that I can see than the sport it affords, as the paucity of their numbers and difficulty of getting the robes out preclude all idea of its consideration as a commercial enterprise.

The animal is described as being larger than the plain buffalo, and darker in the colour. The difference in size may be accounted for by the difference in quality of food peculiar to each, and the difference in colour by the shelter from the bleaching action of the sun on the hair, afforded by the woods.

As regards the musk-ox, this animal inhabits a much more inaccessible country than the wood buffalo; still, to reach the confines of the district which it inhabits is, with the means of travel now available, little more than a pleasure trip. This animal roams over what is commonly known as the "Barren Lands," that is the treeless plain lying east of the fringe of woods lying along the Mackenzie River, north of that along Great Slave Lake and its affluent streams, and west of the Hudson's Bay. I was informed, but cannot give it as authentic, that they had lately been found much farther south, east of Lake Athabasca. They are frequently found within forty or fifty miles of the Mackenzie River down to the Arctic Ocean. Already a white man has entered their grounds twice recently. His object, I understand, was simply to see the region they inhabit, and secure a few heads as trophies. He was accompanied by Mr. McKinley, to whom I have already referred, and whom I will quote from later. They were accompanied by a large number of Indians, who insisted on going with them for the purpose of taking care of their white brothers, should the Esquimaux attack them; but instead of help they proved a nuisance, and had to be provided with food. In connection with this trip, upwards of sixty musk-ox and eighty or ninety caribou were slaughtered, and only a few musk-ox heads were brought out, most of the balance being pure waste. The fame of this trip has induced others to think of striking for this region in quest of the animals for the sake of their skins, and it is only a question of time and dollars until these animals will be hunted extensively.

It appears to me that it would not be imposing any loss or hardship on any outsiders if the Government imposed a close season for these animals as far as outsiders are concerned, and further disallowed any killing unless with the permission of the Government through officers appointed in the district for the purpose. All the animals in the district are the sources of food and revenue of the natives, and should be protected for their subsistence, otherwise they will either starve to death or make their way out to the settled parts and become the wards of the country. The Northwest Council has an ordinance in force prohibiting the killing of any buffalo in any time of the year under severe penalties; there is, therefore, a precedent for strong measures.

I would most respectfully suggest that the Government initiate some measures of protection as soon as possible, generally by inculcating throughout the territory the desirability of a close season for all fur-bearing animals, and specifically as far as the wood buffalo and musk-ox, by preventing slaughter of them for sport. It might be well also to limit the number of skins exported in any one year to such a number as would not exceed the probable rate of increase of animals.

Mr. McKinlay of Resolution thought the close season for them would be about the same as for the moose. He informed me that the Indian method of hunting them was to drive them to some natural barrier and then slaughter them. He said while they were driving them they kept up a continual talk to them, being firmly persuaded that the animals understand what they are saying. The musk-ox drops its young, of which it produces only one at a birth, generally in the month of April. The Indians told Mr. McKinlay that the cows generally bury the young in the snow as soon as they are born, selecting some sheltered spot exposed to the rays of the sun for this purpose. I have also heard that they only do this when they are menaced with danger. About three days after the birth they are able to run with the dam.

Mr. McKinlay informed me that numberless bands of caribou make the Barren Lands their home in the summer months, travelling north to the Arctic Coast in the spring and returning south to the wooded country in the fall. On their migratory journeys they run in vast herds, and the Indians kill large numbers of them, often through sheer love of slaughter. They resort to streams and lakes where the animals cross and spear them while in the water, often killing several hundred. Mr. McKinlay told me that for days they were never out of sight of bands of caribou. He also told me that the average weight of meat yielded by a female caribou is sixty to eighty pounds, and the male about one hundred and fifty, sometimes two hundred.

NATIVES.

I will only refer to those on the Liard and Nelson. I saw very few at Fort Liard, and got no statistics of their numbers, nor did I at Nelson. At the latter place they have a custom from which they will not depart unless under stress of want. The members of a band arrange to await each other at a given point, and then all come into the post together; when within sight of the post they all begin firing their guns as rapidly as they can load and fire until they come into the post. The people at the post return the compliment by mustering all their hands and firing as fast as they can. This is an old custom, and I believe Fort Nelson is the only place it is now practised; I witnessed it while there.

Radically the same language is spoken here and on the Mackenzie and Peace Rivers.

Mr. McKinlay gave me, as I have already stated, much interesting information concerning the country north of Great Slave Lake, from which I will here transcribe some notes.

He, Mr. Pike and party left Resolution 7th May, 1890, proceeding along Great Slave Lake on the ice with dog teams and some Indian aid, of whom one deserted about 100 miles from Resolution. In four days the lake was traversed and the journey continued along the north-east shore three days more to what is known as Fond du Lac, where there used to be a Hudson's Bay Company's post. The shores of the lake here are rocky (apparently Laurentian), and rise, he thinks, about 600 feet above the lake. They are pretty steep and generally bare of trees, until we get to the top, which, in the spaces between the rocks, is timbered with small trees, generally spruce.

A small river falls into the lake here, which the Indians call "Thithy-i," and the native half-breeds "Glace Toujours," both meaning there is always ice here. About half a mile up this stream there is a fall of about twenty feet in height, which in winter accumulates so much ice that it takes nearly all the following summer to melt. This has to be portaged past, and about three miles up, the river is nearly at the level of the plateau. Thence they proceeded in a generally northward course from one small lake to another, often only a few yards. The lakes vary from one-fourth of a mile to twelve or fifteen miles across, but are generally less than two. This course and character of country followed day after day until the 1st of July, but the average distance per day was not more than five miles, and several days were passed in camp. The ridges between the lakes were nearly all bare rock, with timber fringing the lakes and streams.

As I have already stated, the true forest ended about fifty miles north of the lake. The 12th July is entered, "snowed the whole of the day." On the 18th, he remarks, we have found Fish River much better than we anticipated from Anderson's report, few of the rapids being too rough to run with a large canoe they had, which Mr. Pike had with him when he was in the country the year before. They struck the river in the last days of June, and continued down or along it and on its lakes until the 1st July, when the sleds had to be abandoned and travelling by canoe resorted to, although the ice had not yet gone out of the lakes, but a passage could be found round the edge.

On the 22nd July they saw the first sign of Esquimaux, which consisted of stones set up for fire-places, and apparently for the foundation of camps. The ground around was thickly strewn with bones and musk-ox heads, indicating that they had occupied it many times. This was on the north shore of Beechy Lake. Expecting to fall in with some of them they continued along the lake to the end, but saw no further signs of them. They then came to the conclusion that these people did not come up Fish or Back River, but crossed from Bathurst Inlet and came into Beechy Lake by some stream, which entered one of the bays they had not coasted as the ice was all gone now. They turned back from the lower end of the lake on the 24th July, and coasted along looking for entering streams. Soon after passing the site of the Esquimaux camp they found a small river entering a bay. This stream they followed up for about fifteen miles, and found it similar to all the rivers

they had seen in the country, merely a succession of lakes with short stretches of river between. They considered it easily navigable for canoes in good stages of water, and concluded that the Esquimaux who visited the lake cross from Bathurst Inlet to this stream and come down it. They then continued their way homeward, and instead of returning the way they went, they descended what they called Lockhart's River, the head of which they had passed on their way to Fish River. This stream flows into Great Slave Lake east of Fond du Lac. They continued down this river, passing through many small lakes and several large ones, notably Golden, Clinton and Artillery Lakes. When they got within a few miles of Great Slave Lake this river becoming too rough, they had to leave it and make a succession of portages between a lot of small lakes until they reached Great Slave Lake, on the 15th August, and returned to Resolution on the 23rd.

After passing the watershed of Great Slave Lake they found the country less rocky, with many extensive sandy ridges and some loamy flats, on which in sheltered places numerous flowers flourished, many species of which Mr. McKinlay said were common around Resolution. He said he often saw wide expansions along the lake shores covered with fine grass and flowers, reminding him much of the prairies further south. There are also many ridges of rock (granite he called it) of great extent scattered about these prairies. These rocks are fragmentary and curiously thrown and piled together, and it is not uncommon to see immense fragments poised on three or four underneath looking like the work of design more than accident. He noticed bumble bees in several places. North of this watershed there is very little timber and their firewood consisted nearly altogether of driftwood, which they were very glad to get, and sometimes could not succeed in getting any.

The ice on the lakes forms to a depth of more than six feet, which accounts for the length of time it remains the following spring. Trout of great size and fine flavour are very numerous in these lakes, and are easily caught with any kind of bait.

This part of the Barren Land is not, to judge from his description of it, as forbidding as it has often been described, yet there is nothing inviting about it.

Mr. McKinlay told me, while he was at the east end of Great Slave Lake, he heard of a route which some of the Indians sometimes travel from that lake to the water of Hudson's Bay, presumably Chesterfield Inlet. He said the Indians described it as "easy water," with only a short portage over a smooth sandy ridge, leading from one water system to the other. The river falling into Chesterfield Inlet they described as "good water" all the way down, the rapids not being bad.

The Right Rev. Dr. Bompas informed me this river was called by the natives "Fish River," in contradistinction to Big Fish or Back River, the natives calling it by the first name because of the big fish found in its waters.

Mr. McKinlay promised me when he next saw the Indians, who knew this route, he would get them to make a map and give him a description of it, and send the information to me. I got a letter from him dated in December last, but up to that date he had not succeeded, though he had heard somewhat more of the country. The latter information was to the effect that there was a large lake on the watershed, the waters of which flowed both ways, one stream flowing into the bottom of Christie's Bay, in the Great Slave Lake, and the other into Hudson's Bay. This lake is called Sandy Lake. From the account he got of it he inferred it to be about two hundred miles distant from Christie's Bay.

Count de Sainville, as I have already mentioned, imparted to me information concerning the nature of the country he had passed over around the mouth and estuary of the Mackenzie River. He described the country on the westerly shore of the estuary as generally high, with much clay and shale along the beach. That on the eastern shore and as far as he went, with the exception of the Caribou Mountains, is flat and low, with only willow and furze. A prominent characteristic of the coast on this side is the number of conical gravel hills, which rise to a height of 200 to 300 feet. He always found fresh water oozing from the base, which led him to investigate, when he found the interior of these hills consisted of fresh water ice, covered with sand and gravel. Buried in this silt are the trunks of many large trees, which he often cut and used as firewood. Though

those trees must have been in this position many thousand years, he said they still were as sound as if only cut down a year or two ago. Most of them were spruce, and when cut they still emitted its peculiar odour and burned freely. Game he described as being plentiful in the locality, especially wild fowl, which are very numerous. Only Esquimaux are found in the region, the Indians fear them too much to go into their country. The Count has a more favourable opinion of the Esquimaux than most people, and his experience with them would appear to justify it. He says they are most inveterate thieves if you try to conceal anything from them, but leave your property around carelessly as though you did not care whether they took it or not, and it is pretty safe. They seemed to take more delight in defeating your watchfulness than in acquiring your property. The Count thinks the family tie is almost non-existent among them. Men think no more of changing wives for a term or altogether than they would of changing any of their implements, and apart from this, promiscuous intercourse of the sexes is very prevalent, which he thinks accounts for the small numbers of the members of a family, which seldom is more than two or three.

When in Winnipeg, His Honour the Lieutenant-Governor of Manitoba showed me some correspondence he had with the United States Navy Department, some notes on which he was good enough to give me, together with a copy of two charts of part of the Arctic Coast in the vicinity of the Mackenzie estuary; one a chart of the coast line from the 127° meridian west of Greenwich to the 156° , the other a chart of Herschel Island on the same sheet with which is a portion of it much enlarged showing Pearl Cove which is a bay on the south side of the island. As located on the large chart Herschel Island is situated in latitude $69^{\circ} 40'$, longitude 139° close to the coast. It is thus 2° east of the International Boundary.

These charts were compiled from surveys made by the officers of the United States SS. "Thetis" in 1889. This ship was sent by the United States authorities to be in the vicinity of the whaling fleet, and relieve or assist any of them requiring it. Her officers made soundings and determinations which are marked on the chart, but the soundings are marked on farther east than she appears to have gone, and the authority for those is not given. A note on the chart says that the officers of the "Thetis" found the coast line as marked on this chart to be about four miles too far north between the 139° and 146° meridians. It does not appear that any attempt was made to enter Mackenzie River, and the nearest soundings to its mouth as marked on this chart are about ninety miles from the easterly or main mouth of the river. The least depth shown is twelve fathoms and the greatest thirty-seven. Herschel Island is about eighty miles from the most westerly mouth of the Mackenzie, and about one hundred and thirty from the most easterly. This island is between six and seven miles long from east to west, and between three and four wide from north to south. Pearl Cove is a small bay on the south shore near the east end which would afford good shelter from drifting ice to vessels drawing no more than two to three and one-half fathoms. It is about one-half mile deep by a little less in width, and from its position and form is almost land-locked, the island being close to the main land (in places not more than two miles). In fact the whole island affords shelter from north-west, north, or north-east winds and drifts, and no other could effect any harm here.

The point which His Honour wished prominently noticed was the proximity of such a fair harbour to the mouth of the Mackenzie. His Honour also learned from the United States authorities that a whaling vessel called the "Grampus," drawing two and one-half fathoms, had succeeded in getting to within three miles of Shingle Point. This point is about twenty-five miles north-west from the most westerly mouth of the Mackenzie. It does not appear that she made any effort to enter the river.

It is stated that "clear water was found to the eastward of Herschel Island. In Mackenzie Bay the current holds the pack ice off, and all the ice in that vicinity is new ice formed every fall. The ice begins to break about the 20th May, and it begins to thaw from that date up to the 1st June. The pack ice breaks off from 5th to 15th June, and the other ice leaves 1st July. Northerly winds may hold it

sight of the land for a few days, but by 15th July it is out of sight. This occurs every summer and the line of demarcation between clear water and drift ice bearing to the north of Herschel Island is very pronounced. The natives report that this clear water extends all through every summer fifty or sixty miles northward of Mackenzie River."

"It is also said that the tidal flow at Herschel Island is two or three feet. Mackenzie Bay is said to be clear of ice until 1st September, when it begins to form again.

This is about all the information pertaining to our coast line contained on the charts, but one other remark may be noted here. "A north-easterly wind clears the pack off the coast and any vessels going to the eastward after the first week in September or remaining to the eastward after that time should be prepared for wintering."

— This concludes my report, which I trust, sir, will be satisfactory to you and the public. I have spoken of things as I saw them, and have without any prejudice endeavoured to present a truthful account of all that came within the range of my vision or hearing, which I respectfully submit for your information.

I have the honour to be, sir,
Your obedient servant,

WILLIAM OGILVIE,
Dominion Land Surveyor.

